





Bright sparks

Lichens – those silent harbingers of life that enlighten our most ancient history – might be one of nature’s best-kept secrets

Many people will probably be familiar with their spongy jigsaw lobes and lacy fronds like doilies flourishing across tree bark, or blooms of green, silver and orange on pavements, gravestones and statues, yet lichens rarely get the recognition they deserve. These living, breathing organisms are not plants, but the result of a symbiotic relationship between algae and fungus. Often found in undisturbed territories, such as ancient tree trunks, rooftops and crumbling stone walls, they might be mistaken as unscrupulous parasites. They’re more like stitches, however, pulling together patchworks of tiny habitats that provide shelter, water and food for miniscule lifeforms, and they play a crucial role in the food chain and carbon cycle.

Markers of pollution

Lichens, which don’t have roots, take in nutrients from the air, making them an important bioindicator of pollution in the ecosystem. Of the more than 20,000 species worldwide, crustose lichens, which often appear powdery or crusty, are generally the least affected by pollutants and grow in more urban settings. Fruticose and foliose lichens tend to be more vulnerable and prefer rural areas where the air is cleaner.

Under threat

In the UK, some lichens, such as those among the Lobarion community, named for its flagship species tree lungwort, or *Lobaria pulmonaria*, need help to survive. The community, which favours humidity and rainfall, has reduced because of pollution, changes in woodland management and invasive species. One of the charities striving to safeguard their existence is Plantlife. Among its many projects is Building

Resilience in South West Woodlands. Lead community scientist Alison Smith explains: ‘In the UK’s temperate rainforest, the canopy is filled with epiphytic lichens and, where light floods down to the forest floor, they cloak the trees and boulders. This substantial biomass provides food and habitat for a variety of other organisms, playing a crucial role in the food chain and nutrient cycles.’

The value of the charity’s work extends beyond British shores too. ‘The UK has an international responsibility to conserve lichen species found in its temperate rainforests because of their rarity elsewhere,’ says Alison. ‘They suffered through the industrial revolution because they’re sensitive to acid rain and air pollution. Some species that were once widespread across Europe now cling on in the extreme west [of the UK] thanks to clean, warm air from the Gulf Stream, but they often fall off the conservation radar. I’m interested in how we can bring these overlooked but fascinating organisms into the spotlight.’

Lungwort is particularly sensitive to chemicals such as sulphur dioxide, produced in industries including coal mining, and is among those to have suffered a steep decline in the UK and parts of America and mainland Europe. However, the fact it has a common name, a description of its branched leafy network resembling lung tissue, suggests it was once a regular sight. Industrial development has also taken a toll on beard lichens, whose moniker originates from their fuzzy tentacles trailing from tree branches. A fruticose lichen, it is believed to have declined in industrial areas between 1850 and 1950 and is now largely confined to woodlands. Thanks to several clean-air acts, however, the



species is on the rise, with sightings in central England and even on the outskirts of London.

Resilient and diverse

For all their struggles, however, thousands of lichen colonies spread stealthily beneath our noses. Among them are the fancifully named pixie cup and starburst lichens and their less-savoury-sounding counterparts, dog and chewing gum. Take the latter, for example, whose common name reflects its resemblance to flavoured gum and its fondness for hard surfaces including pavements, walls, roof tiles and rocks. A familiar sight in urban car parks, this powdery white lichen has also been recorded in the heat of South American deserts as well as the sub-zero temperatures of Antarctica. The star or sunburst lichen, meanwhile, which is another crustose species, emblazons tree bark and rocks with its yellowy-orange hue.

Dog lichens are a foliose – or leafy – lichen, referring to several species types. It often grows on the ground in open areas that are grassy or gravelly, as well as on sand dunes, mossy boulders and trees, and has frothy, silvery fronds. Its spiky underside, thought to resemble teeth, gave rise to its name and it was used (erroneously) as a cure for rabies in the Middle Ages. Delicate pixie cups are a fruticose lichen found on tree roots, rotting stumps and logs. Named after its stalks, which protrude and open in a goblet-like formation, it's smattered with tiny scales known as squamules or pixie dust.

The list goes on, and it's one of the many reasons that Alison is so fond of them: 'I love their diversity. Communities of species tend to grow in certain habitats, and it's these that I find

fascinating. In the woods where I live in south-east Cornwall, a hazel tree with its smooth bark is a mosaic of crustose lichen species, with barely a square inch of bare bark to be seen. Individual lichens tessellate the trunks with their fruiting bodies, looking like squiggles of black ink or orange jam tarts.'

Other trees also have their own lichen residents, as Alison explains: 'Oak branches are draped in grey-green beard lichens and cloaked with the frilly lobes of foliose lichen species such as the sea-storm. And in the humid river valleys in the south-west's temperate rainforest, we find the Lobarion community growing on hazel, willow, ash and old oaks. This is characterised by large and leafy species. The tree lungwort is probably the most iconic of these with its large, vibrant green lobes, but there are tiny gems too, like the beautifully named elf's ears, which grows in little blue-green clusters and really does resemble minute ears.'

Alison adds that the drier slopes with ancient oaks are home to a different community of grey-and-white crusty lichen, some of which are extremely rare and found on trees more than 300 years old. 'All year, even in the long, dreary winter months, their presence means walks in woodland are still full of colour, life and all its intricate details, if you know where to look.'

Medicinal benefits

Tree lungwort and beard lichen also contain properties that are being harvested for use in medicine and cosmetics. 'They have an array of chemical compounds, which gives them their variety of colours, but also guards against UV damage and herbivory and plant competitors,' says Alison. But these compounds could



also help humankind. 'Medical research is finding new uses for them, for example, extracts from the tree lungwort have been found to help prevent stomach ulcers.'

Usnic acid has also been extracted from beard lichens, among other varieties, for use in antibiotics. According to Icelandic pharmaceutical scientist Kristín Ingólfssdóttir, drugs incorporating the substance are often found to be more effective than penicillin. She says it has been shown to exhibit antiviral, anti-inflammatory, and cancer-fighting properties, and can provide relief from pain and parasitic illness. It's also used by the cosmetics industry in products including toothpaste, mouthwash, deodorants and sun cream. Other lichens, such as oak moss which, contrary to its name, isn't a moss at all, have long been coveted by perfumers, and fabric manufacturers use them in dyes.

Historical wonders

Since the 1950s, lichens have also served as a means to help explore the background of prehistoric monuments and geological evolution. Lichenometry was first used to date glacial moraines (material left behind by glaciers) since its growth, particularly that of the map lichen can span centuries.

Some colonies are estimated to be up to 9,000 years old, making them the oldest living organisms on the planet. Robust map lichen is a crustose species so named for its scaly patchwork appearance. Its resilience was once tested when it was launched into space – it resumed life as normal on its return. One example of its impressive lifespan is to be found on a Cumbrian church roof in north-west England, where a

202mm-diameter colony has been dated from around 1520, the year the building received its first slate roof.

Lichenometry has also been used to deduce the movements and chronology of megalithic structures, including Stonehenge in south-west England. In 1988, Oxford University senior research associate Vanessa Winchester, who conducted a study at another megalithic site, the Rollright Stones, cautioned that varying growth factors and likely cleaning of the stones made lichenometry problematic, but suggested it still had potential to discern some of the landscape's most intriguing mysteries.

British Lichen Society spokesperson Sandy Robbins agrees: 'Any prehistoric monument will have gathered lichens unto itself except, in some cases, where man has decided to remove the biological growths for some obscure reason, so that long link with time and lichens has been broken.'

But their life-affirming quality is beyond doubt. 'Whether walking on the hills and seeing patches of lichen covering rocks and cliffs with coloured mosaics or strolling in a churchyard and looking at gravestones, the story of lichens quietly landing, getting comfortable and then silently spreading over time is a comforting one,' adds Sandy.

Indeed, as well as their ability to unlock the past and safeguard the future, lichens in all their guises – lacy tree cosies, frosted tinsel trailing from branches or firework bursts against concrete – serve as a reminder that life flourishes in the most desolate places and in the darkest of seasons.

Words: Cat Thompson