

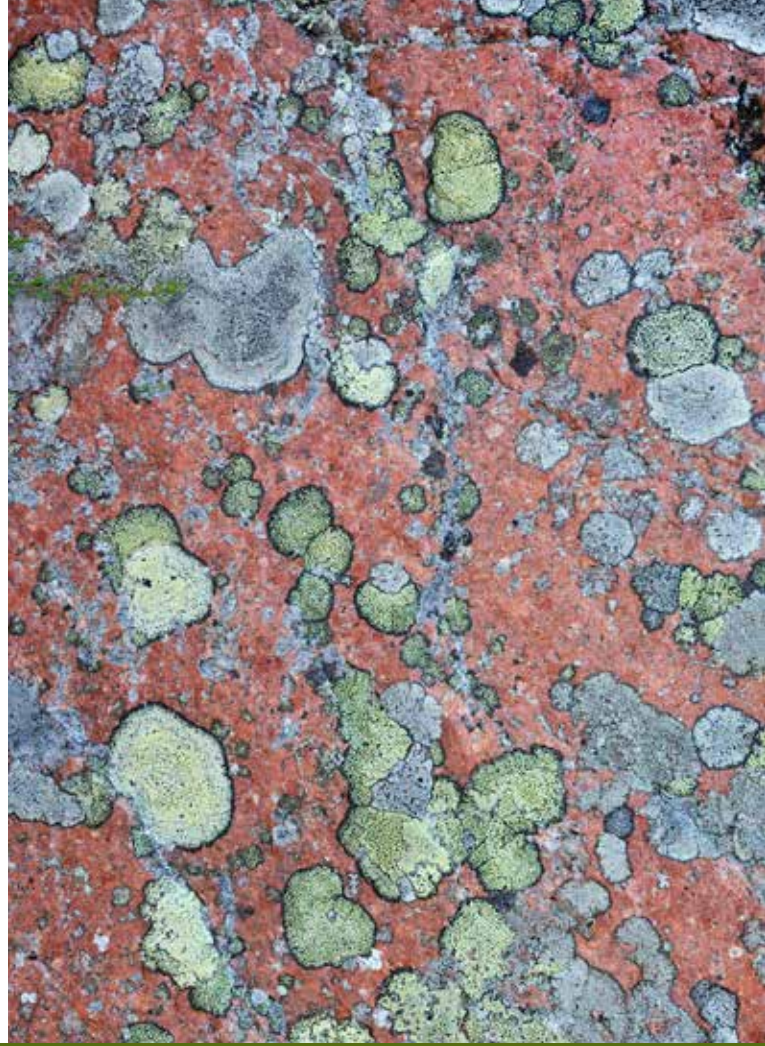
Australian Garden

vol 28 no 3 January 2017

HISTORY



Marion Halligan reflects
Australian flora in the UK
a NZ gardening partnership



Alison Pouliot

Lichens in the garden – and attic

Left: Lichens are often admired for their delicate beauty.

Right: A richly coloured palette of lichen-dappled granite.

photos Alison Pouliot

A delicate crushable tundra

It is pretty hard to find a garden, especially an old one, without lichens. The rich palette of lichen textures, forms and colours reminds us that the living world is not just utilitarian, but lavishly aesthetic. Lichens convert garden substrates into dappled tapestries, festoons of thalli and carpeted dingles. Patinas of lichens add character to wood, stone and soil, as well as to human-crafted compounds such as glass and metal, plastic and paint. Every garden substrate offers a blank canvas of inhabitable real estate for enterprising lichens.

Although often overlooked, lichens are integral members of gardens. Poet and environmentalist Judith Wright lamented the ‘delicate crushable tundra’ of ‘lichens, mosses and fungi’ that are vulnerable to human indifference. Lichens not only delight and charm, but perform vital ecological functions. Many possess anti-herbivory

chemicals and some that grow on trees impart this protection to their woody hosts, shielding them from insect attack. Lichens extract water from wafts of mist or dew, trapping humidity and creating favourable microclimates for garden plants. They also retrieve nutrients from the moisture they absorb, as well as from the air. All lichens fix carbon and many fix nitrogen. Birds seek lichens in gardens to line and camouflage their nests. Perhaps most significantly, lichens provide something that is in short supply in many Australian gardens – soil.

Lichens create soil through the process known as pedogenesis, enriching it further when they themselves die and decompose. Almost all plants require soil before they can colonise. Lichens not only create soils but also stabilise them, increase water infiltration, and provide safe havens for seeds, all of which contributes to the necessary conditions that allow plants to establish and grow.



In desert gardens lichens are especially important in holding soil together as part of biological soil crusts (usually a composite of cyanobacteria, green algae, microfungi, mosses, liverworts and lichens), preventing erosion and creating microhabitats. Diverse lichen communities in gardens also remind us that the garden is in good health.

Thinking lichens

No lichen is an individual organism – rather, it is an intimate association between fungi, algae and often cyanobacteria. Yeasts have also recently been found to play a role in the union. Lichens are intricate entanglements, reciprocal collaborations. All sorts of analogies have sprung up to describe the multiple identities of lichens, depending on how the lichen alliance is perceived. Some folk focus on a lichen's individual components, while others emphasise the relationship and the lichen as an emergent property (ie the whole being greater than its parts). Lichens have been variously referred to as an ecosystem; a master–slave relationship; fungi that have discovered agriculture; a fungus dietary strategy; algal farmsteads, or fungal greenhouses. All represent ways to make sense of their communal lifestyles and curious modes of existence.

Swedish botanist Erik Acharius (1757–1819) was known as the ‘father of lichenology’ and developed the first coherent lichen classification system. However, it was Swiss botanist Simon Schwendener (1829–1919) who differentiated a lichen as a ‘them’ not an ‘it’. Scientists of the time were less adaptable than lichens, and Schwendener’s theory was denounced for contradicting Linnaean concepts. The exact nature of the relationship (whether truly mutualistic or parasitic) remains in dispute today. However, despite an incomplete understanding of lichen function, these organisms tickled the imagination, and the lichenological lexicon inspiring vernacular names such as lipstick powderhorn, netted specklebelly, blistered script and whiskered jelly.

The lace-like coral lichen *Cladia retipora* was the first lichen to be described in Australia. French naturalist Jacques Labillardière collected it in 1792 during the same expedition in which he also recorded Australia’s first fleshy fungus, the anemone stinkhorn, *Aseroe rubra*. Lichens are the most well studied group of fungi in Australia today. Over 3700 species have been described. Thirty-six per cent are thought to be endemic.

Left: Many species of *Usnea* are found in areas of low atmospheric pollution.

Right: A heart-shaped map lichen, *Rhizocarpon geographicum*.
photos Alison Pouliot



Left: Some lichens have a penchant for human constructions such as this old wheel.

Right: The disc-shaped reproductive structures, or apothecia, of a *Parmelia* lichen.
photos Alison Pouliot

However one perceives and interprets the lichen entity, one evocative approach is to consider lichen as muse. Lichens help us think and imagine differently. They teach us about time. Patience and slowness. Attentiveness. Close looking and careful observation. Cooperation. Lichens are ancient and gradual. They are also archives of environmental change. The presence of lichens in particular places tells us not just about lichen distribution, but also about the environmental history of that place.

Lichen chronicles

Many lichens are robust and durable, delicate yet resilient. They have earned the moniker *extremophiles* – some occupy the edges of biological limits from deserts to the Arctic, while others are more sensitive, and unable to withstand major changes in their growing conditions. The industrial revolution saw the disappearance of lichens intolerant of sulphur dioxide. Pollution is considered to be a major reason for the changed distribution of some lichen species between pre-industrial and present-day Britain. Some lichens, however, have been involuntarily preserved on felled trees used as building materials.

Historical jigsaws

We can even unfold environmental histories by studying lichens attached to the rafters of old buildings. Because of the particularity of lichen

habitat choices, they provide opportunities to interpret historical climates and air quality as well as forest structure and management. Scientists in Britain have been using evidence supplied by the lichens preserved in historic buildings to explore the pre-Victorian landscape. For hundreds of years lichens have remained secretly unobserved in their state of suspended animation, clinging to the joists, staves and beams of pre-industrial houses. The presence of a particular lichen reveals information about where the tree and lichen were growing before harvesting. For example, some lichen communities grow only in old-growth forests, while others typify areas exposed to strong light. Comparing contemporary lichen distribution and abundance helps us to map and interpret historical communities. We can infer much about the type and condition of historical environments from this eye-opening archive of desiccated lichens. Many species are absent today in regions exposed to air pollution. Lichenologists are painstakingly piecing together the lichen jigsaw to reveal historical environmental stories.

Lichens enrich our enjoyment of gardens and offer a compelling historical record. Every garden holds a lichen chronicle waiting to be discovered and translated.

Dr Alison Pouliot is an ecologist and environmental photographer, whose recent PhD is on human perceptions of fungi.