



Title: 'Sunburst lichen'

Description: Sunburst lichen (*Xanthoria parietina*) growing on a rock at Waikawa Marina

Photographer's name: Noelle Bennett

Where and when: Waikawa Marina, Marlborough. August 2021.

Sustainability: Nothing about lichens is simple. They are not single creatures, but a composite organism comprised of at least two and maybe over 100 species: each is a coalition of fungi, an algae and/or cyanobacteria. Because fungi provide structure (the 'house') to the lichen, it is sometimes considered to be the dominant partner of the symbiotic relationship. But structure is nothing without its 'engine'. It is the algae and cyanobacteria that provide the fuel for their joined lives. These tiny, chlorophyll-rich organisms capture water and nitrogen from the air and nutrients captured from dust, and use sunlight to bind them together to make carbohydrates. These carbohydrates feed the entire lichen. Fungi protect themselves and the algae from infection because they are very good at producing antimicrobials. How's all that for being amicable flatmates?

Lichens have evolved numerous times in earth's history to create over 20,000 species. This repeated process of convergent evolution indicates that this is a very successful lifeform in their own right. They also perform essential roles for whole ecosystems. Many lichens contain acidic compounds that very slowly dissolve stone to obtain nutrients – so lichens are very slowly turning stone into soil and starting the massive mineral cycles on which life depends – you can think of the lichens as providing a main pathway or portal for transforming inanimate material into life forms. Some lichens can be rich sources of carbohydrates, making them a viable food source for animals, big (e.g. reindeer) and small (insects).

The powerful alliance between plant-like organisms such as algae and cyanobacteria produces an organism that can weather hard times, harsh environments and withstand pathogenic infection. Many fungi do have one weakness, however: they require clean, unpolluted air. Therefore few flourish in urban settings. This is valuable for environmental scientists who use lichens as 'Indicator species' which signal environmental quality. Where lichen are

abundant and diverse, you can be sure the air is good – if they fade out you know air quality is degrading.

So, lichens have to be nature's ultimate example of the benefits of cooperation. They are a branch of life that truly deserves our full attention and respect. You can read more about lichens in the description of my photograph "Crustose Lichen" in this gallery.

Photographer's notes: There are so many things in nature that we simply ignore probably because they seem a little mundane or unexciting. But if we simply take the time to look at these apparent non-entities, such a journey of discovery opens up to us. That's certainly what happened to me with lichen.

Photo specs: This individual image was focus-stacked using 30 images taken at five unit increments to ensure the whole of the structure was in sharp focus. Technical specs: The image was taken using a Panasonic DC-G9 camera and a Panasonic Leica DG Macro-Elmarit 45mm f/2.8 macro lens. Exposure details - 1/160 sec at f5.6 with an ISO of 100 and a focal length of 45mm (90mm full frame equivalent).

Digital specs: 6384 x 5382 pixels (34.36MP) @ 300dpi

Key words: lichen, sunburst lichen, *Xanthoria*, *Xanthoria parietina*, Waikawa, algae, cyanobacteria, fungus, fungi, Mineral cycles, soil formation, indicator species, Noelle Bennett, Ecosystems Photography, sustainability.

Price: \$150 (incl. GST) for use of the digital image. Visit www.ecosystemsphtography.com/sales for details & to order, or to get a quote if you would like a high-quality print.

Donation: The price includes a \$100 donation to a sustainability organisation or project of your choice, or otherwise to the *Marlborough Branch of the Royal Forest & Bird Protection Society* <https://www.forestandbird.org.nz/branches/marlborough>.

We recommend that the donation goes to *the Marlborough Branch of the Royal Forest & Bird Protection Society* to support their work on environmental monitoring, advocacy and education. Regional offices keep their eyes and ears tuned for local issues and combine with other branches to support a vigorous and effective national body based in Wellington – a good example of thinking nationally and acting locally.

Image ref: NB#022 (please use this reference in all orders and correspondence).

Noelle Bennett

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