



Encyclopedia of Life

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## Lichens Podcast and Scientist Interview

### *Xanthoparmelia plittii*

Most of us walk past lichen-covered rocks, splotched with grays, greens, and golds, without giving them a closer look. Ari Daniel Shapiro visits with mycologist Anne Pringle and graduate student Benjamin Wolfe to learn about these amazing symbiotic organisms, formed when a fungus partners with an algae. Each lichen can host an entire microcosm, a microbial landscape teeming with life. These worlds-within-worlds are proving an invaluable tool for scientists studying our changing landscapes.

#### Transcript

**Ari:** From the Encyclopedia of Life, this is: One Species at a Time. I'm Ari Daniel Shapiro.

In the heart of Cambridge, Massachusetts – in bustling Harvard Square – sits a small cemetery called the Old Burying Ground. 1200 historic tombstones huddle inside, including a handful of local Revolutionary War heroes. <Pringle: 1765...>

Anne Pringle is an associate professor at Harvard. And this isn't her first time visiting this cemetery.

**Pringle:** The funniest comment I ever got was somebody...somebody who thought that I was mourning. And they were wondering why I was mourning for so very long on my hands and knees in front of a particular tombstone.

**Ari:** And what were you doing in fact?

**Pringle:** I was counting lichens.

**Ari:** Pringle's a mycologist. That is, she studies fungi. And lichens are a special type of fungi. They're often first to colonize new habitats, and they can grow on tree bark, fence posts, and stones...including tombstones like the ones in this cemetery. But that's not all.

Back in her office, Pringle unfolds a paper packet containing a kind of lichen called *Xanthoparmelia plittii*. She points at the tiny, crusty swirls the color of spearmint.

**Pringle:** Lichens are symbioses...that means that they are made up of multiple species living together. And generally, a lichen is one individual fungus. And living inside embedded in the matrix of that fungus, there are algae, and maybe more than one species of algae.

**Ari:** It's a complicated organism. A lichen is a fungus with algae living inside it. The algae photosynthesize, converting carbon dioxide into sugars – food that the fungus can consume. It's not clear whether the algae get anything out of the arrangement, except maybe a home they wouldn't otherwise have.

**Pringle:** What's also interesting about a lichen is realizing that it's an entire habitat for other creatures inside it. Of bacteria, of other fungi. So when you look at a lichen, when you're walking by, it's not just an individual – it's an entire ecosystem, sort of like a tropical rainforest in miniature just maybe the size of the palm of your hand growing on a fencepost.

**Ari:** Within the lichen, how many species are there – of the bacteria, the fungi, the algae?

**Pringle:** Oh, I don't know. Hundreds, order of magnitude.

**Ari:** So, our series is called One Species at a Time.

**Pringle:** Yeah, a lichen is actually a perfect choice because it appears to be a species, but if you unpack it, it's a lot more than that.

**Ari:** Next door, in Pringle's lab, PhD student Benjamin Wolfe holds up what looks like a giant black potato chip the size of his hand. This lichen's a different species – *Umbilicaria mammulata* – but the story, it's the same.

**Wolfe:** So if you look on the back of it, you see it's, like, this very rough, velvety surface. If you touch it, yeah... <velvet rubbing sound> Those little nooks and crannies are great places for bacteria to live. And I've done a little bit of work using these high powered microscopes to zoom in on the back of these and you see these huge microbial landscapes – little bacterial gardens nestled into this forest of these underbellies of the lichens. So it's this sort of this idea of a world within a world.

**Ari:** Unlike other types of fungi that live pretty much concealed inside trees or in the dirt, lichens – these worlds within worlds – are exposed entirely to the elements.

So at a place like the Old Burying Ground in Cambridge, the lichens dotting the tombstones have to handle whatever the environment throws their way. Usually lichens do really well, but not always. Anne Pringle.

**Pringle:** Here in a cemetery, there used to be a thriving community of lichens, and now there isn't because of the pollution that humans have created. When we walk into a cemetery in rural Massachusetts, it's a very different landscape. The tombstones are covered in green. They're covered in very beautiful leaf-like lichens. It's an entire world that just has disappeared from this local habitat.

**Ari:** Pringle's comparing the lichens in urban and rural settings – to see how long they live, and how they grow and reproduce. She can use this information to think about how fungi more generally might react to changes in climate and pollution, and what that might mean for entire ecosystems – both the little ones living on and in the fungi, and the big ones that depend on fungi as decomposers.

**Pringle:** It's worth thinking about...the things that we do, the cars that we drive have an impact on a lot of other species, and not just communities of things with fur and feathers that fly and are cute. But entire worlds of things that are almost invisible to humans, either because we don't pay attention, or because in fact they're microscopic. So we may ignore them, but we certainly depend on them.

**Ari:** Pay a visit to eol.org to see photos of those bacterial gardens populating a lichen. And to hear Anne Pringle explain what lichens have to do with reindeer and the 1986 Chernobyl nuclear disaster.

Our series, One Species at a Time, is produced by Atlantic Public Media in Woods Hole, Massachusetts. For the Encyclopedia of Life, I'm Ari Daniel Shapiro.

## Meet the Scientist

Meet Ann Pringle, the scientist featured in the Lichen Podcast:



**Where do you work?**

I work at Harvard University's Department of Organismic and Evolutionary Biology. (In 2015 Dr. Pringle moved to the University of Wisconsin)

**What do you study?**

I explore how seemingly immobile and often symbiotic organisms move across landscapes, particularly in the contexts of anthropogenic change.

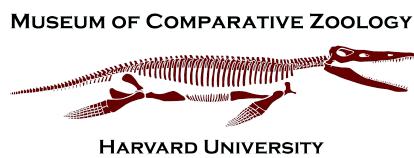
**What are three titles you would give yourself?**

Mycologist, ecologist, writer

What do you like to do when you are not working? I take care of my two little girls, ages 10 and 7.

**What do you like most about science?**

The creative process. I like challenging paradigms, discovery, and I like teaching others about how the world works.



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