

## HERE FOR A LONG TIME, NOT A GOOD TIME

*Map lichens are the masters of longevity*

**H**umans are by no means the final word on durability. Whereas you and I can expect to complete our life cycles in under a century, many bacteria, algae, and protozoans arguably live on forever.

An aging amoeba, for example, never actually dies of old age. When its time has come, it merely divides into two "young" amoebas, and thus lives on as its own offspring. Nowhere will you find an amoeboid corpse to mark the passing of one amoeboid generation to the next.

Even among organisms having recognizable life spans, human longevity is nothing to write home about. Methuselah's 969 years aside, the greatest authenticated age ever attained by *Homo sapiens* is 120 years. Outstripping this are the life spans of all manner of creatures, including giant tortoises (177 years), English ivies (440 years), lindens (815 years), honey mushrooms (1500 years), Sierra redwoods (2300 years), and bristlecone pines (4900 years).

According to a board game I once played, it is the bristlecone pine that deserves the crown as "oldest living thing on earth." Not so, replies the lichenologist.

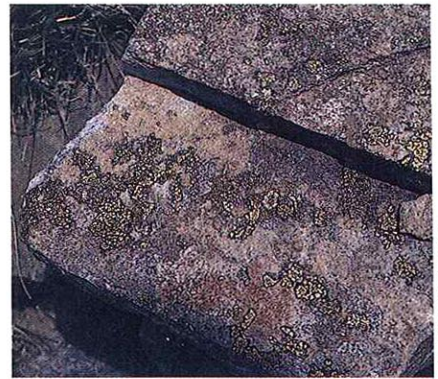
To a certain extent, the life spans of lichens are an evolutionary artifact of the habitats they occupy. Soil-dwelling lichens colonizing after a forest fire, for example, must complete their life cycles quickly, or risk being shaded out by new trees springing up to replace the old. Likewise, the lichens that later colonize the branches of those same trees: they are programmed to endure only about as long as the branches on which they grow. A life span of approximately 30 to 50 years is said to be average for such species.

Not surprisingly, then, the oldest lichens live in places that are themselves

essentially timeless. The surfaces of rocks for one. Lichens that cling to rocks in arctic and alpine habitats are well adapted to withstand wind, snow, and subfreezing temperatures severe enough to exclude trees and shrubs that would otherwise eventually exclude the lichens. Ice-riven, sun-baked, arctic and alpine lichens enjoy a degree of environmental "stability" virtually unknown in more temperate climes. In such a world, lichens are free to trace their slow designs indefinitely.

Consider, for instance, the map lichen, *Rhizocarpon geographicum*. A yellow-green crust of nearly fluorescent hue, it organizes in loose mosaics over the surface of acid rocks. If you've ever stumped across a mountain boulder field, or reconnoitred an arctic horizon from some rocky ridge, you've doubtless kept company with map lichens. Though the hiker passes on, the lichenologist sometimes lingers long enough to estimate some maximum ages: 3100 years in the Front Ranges of Colorado; 8300 years on Swedish Lapland; 9800 years on Baffin Island.

Just how big is a 9800-year-old map lichen? Not much bigger, it turns out, than a family-sized pizza. Lichens are slow growers in the extreme. Even the most expansive of them festooning the branches of Sitka spruce along Canada's Pacific coast seldom put on more than a few centimetres in a year. By contrast, the growth rates of the slowest growing map lichens are almost painful to contemplate. Imagine an organism so dilatory that it enlarges by only two or three centimetres in 1000 years.



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Map lichen, *Rhizocarpon geographicum*

That the slowest growing lichens are also the longest lived is probably not coincidental. According to one theory of aging, senescence results when cumulative errors are introduced by dividing cells miscopying the genetic code. As errors accumulate, life processes are impeded and the organism eventually dies.

Like others of their kind, arctic map lichens depend on moist, "warm" weather for physiological activity. Not surprisingly, they spend most of their lives in a state of suspended animation. Only for a few months of each year do they breathe and photosynthesize. Genetic errors, under such conditions, must be a long, long while in accumulating. That's one theory, anyhow.

If lichenologists have got their estimates right, and if the world's oldest lichens truly date from 10,000 years ago, these venerable thalli must have begun life shortly after the glaciers of the last ice age relinquished their grip on Canada's North. This, it will be admitted, is a sobering thought. More sobering still is the realization that these same thalli will probably be in place some centuries hence when the next ice age arrives to wipe the slate clean again. 🍄

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