

Review

The Lives of Lichens: A Natural History

Reviewed by

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Robert Lücking and Toby Spribille. 2024. *The Lives of Lichens: A Natural History*. Princeton University Press, Princeton, New Jersey, U.S.A. Hardcover, US\$35.00/£30.00. ISBN: 9780691247274. Published June 4, 2024. 288 pp, 7.5 × 9.5 in., 150 + color illus.



This remarkable addition to popular literature on lichens offers an up-to-date, authoritative look at lichens—what they are, how they live, their importance to nature and people and their beauty. The book is clearly directed to a general audience, those interested in the natural world who want to learn what lichens are all about. They have seen them, they have read about them in the newspaper (thanks, in part, to the discoveries of one of the authors), and they want to learn more. These are the individuals for whom Princeton University Press (PUP) has created a series of richly illustrated, authoritative but plainly written books entitled, “The Lives of the Natural World,” covering topics such as frogs, spiders, beetles and more. PUP describes the series as featuring “in-depth, essay-led chapters and beautifully illustrated profiles of selected species,” that “explore the evolution, behaviors, and ecologies of fascinating organisms, and offer brand-new science and modern insights,” which is precisely what authors Robert Lücking and Toby Spribille have delivered.

Those familiar with Robert Lücking’s stunning color photographs of lichens, which he has used to good advantage in many of his scientific publications, will be glad to hear that a large percentage of the photographs in the book are his. They are reproduced by PUP in perfectly rendered color, sharpness and placement, dozens of them occupying a full or almost full page, and on glossy paper to show them to best advantage. These pictures, together with many others gathered from a score of other talented photographers, provide us with some of the most informative, provocative and beautiful images that I have seen

in any book on lichens, and that includes the outstanding illustrations found in *The Lichens of Germany* (Wirth 2013a,b), *The Lichens of Finland* (Stenroos et al. 2011), and yes, even *Lichens of North America* (Brodo et al. 2001). The drawings and diagrams, apparently all original and prepared specifically for this volume by John Woodcock and Chelsea Lau, are no less impressive and do a great deal to explain and supplement the material in the text.

After a brief Introduction, the book is divided into seven unnumbered main sections, and each section is further divided into shorter, two-to-six-page, unnumbered essay/chapters. The chapters then lead to five or six profiles of particularly charismatic or informative lichens (including a few algae and fungi), each illustrating some special feature of lichens or lichenology. This format is apparently used in all the contributions to Princeton Press’s “Lives of the Natural World” series, and it works well. The writing is upbeat and journalistic rather than scholarly and pedantic, clearly designed to draw in the general reader. Although the texts cover the latest thinking and discoveries in lichenology, no references are given, not even suggestions for “Further Reading” as sometimes appear in popular treatments. Perhaps the authors can be excused for occasionally lapsing into anthropomorphic phraseology in the effort to sound “with it” and casual. It certainly makes for easy and engaging reading.

The first section is called “The Archetypal Symbiosis,” tracing the history of the concept of symbiosis, the early study of lichens and Schwendener’s proposal that lichens are dual organisms, and early attempts at

reconstructing lichens in the lab, ending with a description of David Smith's elegant experiments on the flow of carbohydrates between lichen components. A clever use of artificially colored electron micrographs enhances the descriptions of lichen thallus structure.

The second section, "The Players," begins with the origins and evolution of lichenization with descriptions, first of the main components of lichens, and then of the minor players and their possible physiological and morphogenetic roles. The latter include, of course, the recent discoveries of Toby Spribille and colleagues of a surprising role of basidiomycete yeasts in lichens. Sexual reproduction in lichens is also covered in some detail with illustrations and lucid explanations.

"The Biology of Lichens" is treated in the third section with chapters on ecophysiology, growth rate, colors, survival in extreme environments (including polluted cities), and finally a consideration of lichens in a changing climate. In all these discussions, modern research results are highlighted but, as I noted before, not referenced. Enough information is presented so that the reader can almost certainly find the pertinent literature with some resourceful "Googling."

Section four covers "Lichen Architecture," and begins with Ernst Haeckel's amazing black-and-white plate from *Art Forms in Nature* (Haeckel 1904) showing the impressive diversity of lichen forms, then reimaged by the authors as a montage of full color photographs. A discussion of morphogenesis in the intact lichen follows with thoughts about the influence of the photobionts (and other newly discovered lichen components!) on the final lichen form and chemistry and how evolution works on these forms. This leads to a treatment of convergent evolution, cephalodia and photosymbiodemes, and finally asexual reproductive structures and strategies.

The fifth section, on "Evolution and Taxonomy," begins the second half of the volume, even though evolutionary theory and processes have been discussed already in other sections. Here, the authors discuss in considerable detail the history and phylogeny of lichen fungi beginning with the fossil record and proceeding to recent DNA studies that have led to the discovery of cryptic speciation, strange ancestries (e.g., *Candelaria*), and finally the appearance and disappearance of lichenization in various lineages and the relationships of lichenized and unlichenized fungal groups. I found this to be one of the most fascinating parts of

the book. A consideration of how lichens are named, with possible alternatives, is then introduced, all very thought provoking.

"Lichen Ecosystems" is the subject of the sixth section where lichen substrates, habitats and distributions are highlighted. It might be pointed out that on the inset map on page 193, the pale yellow areas show the tundra, not *Cladonia*-dominated boreal regions as stated, but that is a minor glitch in the otherwise informative and accurate discussion of favourable lichen habitats. Leaves as substrates get special mention, not surprising given the interests of the first author. Nutrient cycling and the importance of lichens in nitrogen input get prominent mention several places in the book but especially here. Animals come into the picture (literally; the photographs are superb) with respect to their lichen diet and camouflage to look like lichens. Conservation and urban lichens also are given prominence.

A book written for a general audience would not be complete without a thorough treatment of "Lichens and People," which is the title of the seventh and final section. Lücking and Spribille do not disappoint. They present a fascinating history of lichens as medicine and food as well as a discussion of lichens used commercially as dye sources, perfumes, model vegetation and litmus. A long chapter on lichens in art with many modern examples wraps up this section and the book, except for some philosophical musings about lichens as metaphors for coexistence, tolerance, mutual help and sexual diversity to which I can only say, "amen."

No book is totally error-free, but errors are exceedingly rare in this carefully written and well-edited book. I could not find a single typographic error. However, in the profile of "Wila" (*Bryoria fremontii*), the map is not an accurate picture (in red) of the distribution of the species. And I can't imagine what the authors refer to in "Notable Features" of the species by stating, "Black glossy perithecia on a whitish to brownish thallus." Still, such minor glitches stand out because of their rarity.

Who would enjoy reading this book? Certainly, anyone with the slightest interest in the natural world, but especially for those who have heard about lichens but know almost nothing about them. That said, I think that even the most experienced of professional lichenologists can learn a great deal from this lavishly illustrated and yet moderately priced book, and I'm sure they would thoroughly enjoy reading the informally

written but well-crafted text. It brings us up to date with well-researched comments on what we know about lichens and launches us into the coming decades of research when much more will be discovered.

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