Lichen communities under microclimate gradient along a tree trunk in the dry evergreen forest, Thailand

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Distribution of lichen in tropical forests is influenced by microclimate under the canopy. Climate change could possibly lead to changes in community structures and ecosystems. This study explored lichen distribution along a tree trunk in a dry evergreen forest. It provided information on the influences of microclimate on species existence, which is essential for further conservation. Quadrates of 20 × 60 cm encompassed 12 subplots were placed along the trunk at the canopy, mid trunk and tree-base facing the East aspect. A total of 284 thalli were discovered, consisting of 26 species. The canopy, mid trunk, and tree base hosted 16, 8 and 7 species of lichens, covering 56%, 65% and 85% of the quadrate areas respectively. Only 1 taxa inhabited all three levels, and 3 species occupied two levels. Thirteen species restricted to only the canopy, whereas the mid trunk and the base had 4 and 3 species-specific levels. Important value index (IVI) revealed that Sterile soredia 2, Sterile nonpropaglue 3, Sterile soredia 3, *Pyrenula aspistea*, and *Graphis furcata* dominated the tree trunk. Lichens producing isidia colonized only the canopy, whereas those that produce soredia settled at all levels.

High photobiont diversity in the common European soil crust lichen *Psora decipiens*

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To get insights into function and strategies of a successful establishment of lichens on biological soil crusts, the genetic diversity of the green algal photobionts of *Psora decipiens* was studied as part of the SCIN-project (Soil Crust InterNational). Lichen samples were collected from four different sites along latitudinal and altitudinal gradients in Europe (Tabernas/Spain; Hochtor-Großglockner/Austria; Gynge Alvar/Sweden; Ruine Homburg/Germany). The genetic identification of chlorobionts was carried out using the nuclear marker (nrITS) and a chloroplast marker (psbL-J). *Psora decipiens* was associated with several different species of *Trebouxia* and *Asterochloris*, although previously described to only have *Asterochloris* sp. as photobiont. The phylogenetic analyses revealed a high diversity with 17 well supported clades. Most of the photobiont species appeared to be cosmopolitan, but five clades were unevenly distributed between the sampling sites with only *Trebouxia* being found in the warm and dry Spanish habitats and combinations of *Trebouxia* and *Asterochloris* in the cooler and more humid habitats. The wide range of chlorobiont species might contribute to the observed domination of *P. decipiens* at all four research sites of the SCIN project which range from a desert in Spain to an alpine site in the Alps of Austria.

Diversity of lichens along a new world latitudinal gradient

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One phenomenon that has long been observed, but the mechanism of which has long been debated, is the latitudinal gradient in biological diversity. Many taxa, including flowering plants, mammals and amphibians, have been demonstrated to follow this pattern. Fungal groups have been, until recently, neglected, and their biogeography is controversial given their often-cryptic diversity. While some small-scale studies of the lichen latitudinal diversity gradient have been conducted with mixed results, no large-scale investigation combining currently existing collection data with a systematic field sampling approach, has been attempted. Here I present work from my dissertation on the diversity of lichenized fungi along a New World latitudinal gradient, combining herbarium specimen data with lichens collected from four sites from 10 degrees to 42 degrees North, as part of a larger gradient study from -39 degrees South to 61 degrees North. I compare species richness and species accumulation curves for these four sites, and compare this to herbarium collection data from these locations. I also investigate the functional diversity of lichens at these four locations, and begin to determine potential drivers of lichen diversity along this latitudinal gradient

Photobiont partners extend range and Hutchinsonian niche space of mycobionts in *Lasallia pustulata*

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Symbiont shuffling in mutualistic associations is an expected mechanism that could mediate the impact of ongoing climate change on the geographic and ecological distribution of holobionts. For instance, diversity in host-symbiont pairings at the sub-species level has been related to functional variation in response to environmental change in reef-building corals and their photosynthetic symbionts. In the same way, plasticity in mycobiont-photobiont interactions may explain the broad ecological niches of many lichen-forming fungi. Here we test this hypothesis at a broad geographic scale. We examine the population genetic structure of *Lasallia pustulata* holobionts throughout their European distribution range, based on sequences of MCM7 (mycobiont) and ITS rDNA (photobiont). We show that occurrence probabilities of specific mycobiont-photobiont interactions are linked to climatic niches. Quantification of niche extent and geographical overlap of haplotypes based on (i) species distribution modeling and (ii) construction of Hutchinsonian climatic hypervolumes revealed that combinations of fungal-algal interactions change at the sub-species level along latitudinal temperature gradients and in Mediterranean climate zones. We discuss our results in the light of symbiont polymorphism and partner shuffling as potential mechanisms of environmental adaptation and niche expansion in lichens.