

Exploring symbiont fidelity among lichen symbioses and the common alga *Trebouxia decolorans* s.l.: different levels of intrathalline photobiont diversity in *Xanthoria parietina* and *Anaptychia ciliaris*

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Introduction

Algae of the genus *Trebouxia* represent the most common photobionts in lichens. Due to the lack of variable markers, their diversity and population biology is little understood. Recently, microsatellite markers were developed for the common species *Trebouxia decolorans* s.l., associated, amongst others, with the lichens *Xanthoria parietina* and *Anaptychia ciliaris*. The former is a widespread lichen, known for its high regenerative capacity and broad ecological tolerance, while the latter has a more limited distribution and is locally endangered in Europe. Our study takes advantage of the high mutation rate of microsatellite markers to compare the intrathalline algal genetic diversity in these two lichen symbioses. In particular, we test the hypothesis that high regenerative capacity of a lichen thallus leads to a higher intrathalline algal genetic diversity.

Materials and Methods

Four to six samples from 20 thalli of *X. parietina* and *A. ciliaris* were genotyped at ten alga-specific microsatellite loci. Algae were analysed for their clonal diversity, and selectivity was evaluated using link analysis (deltaA).

Results

Our results show that *A. ciliaris* is highly selective towards specific photobiont genotypes, being associated with only a single algal genotype in each thallus. Conversely, *X. parietina* thalli harbour a mosaic of algal genotypes. Uniform deltaA distribution suggests that newly grown areas of *X. parietina* thalli acquire algae through horizontal transmission.

Conclusions

The capacity of *X. parietina* to utilise many different algal strains within a single thallus may contribute to the ecological success and wide distribution of this lichen. Conversely, specialisation on a single photobiont lineage may hinder dispersal and establishment of the more selective *A. ciliaris*.