**PHOTOBIONT GENUS AND CARBON-CONCENTRATING MECHANISMS MATTER FOR LICHEN ECOLOGY**

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Lichen photobionts are influenced by environmental changes and may limit the presence of certain lichen species in unfavorable habitats (e.g., *Trentepohlia* is usually found in humid and warmer areas). Carbon-concentrating mechanisms (CCMs) are a widespread phenomenon that evolved to increase the ratio of carbon/oxygen within the chloroplast. Examples are the C4 and CAM (crassulacean acid metabolism) photosynthesis in plants, the pyrenoids in green algae and the carboxysomes in cyanobacteria. In vascular plants the evolution of CCMs is a major innovation while in some algae they have been lost, in both cases associated with significant environmental range shifts. What about lichens: do carbon-concentrating mechanisms constitute a major trait in structuring communities, just as they do in vascular plants? Based on a large-scale dataset of lichen communities from eastern North America, we hypothesize that photobiont identity varies across environmental gradients and that CCM presence/absence is a better predictor of environmental response than photobiont lineage alone. The dataset comprised 1208 species, representing the total lichen biodiversity (all substrates and growth forms) inventoried in 630 one-hectare sites. Photobiont genera were retrieved from publications and classified based on the presence/absence of CCMs. Community weighted means were calculated and linear models were used to explore the data and look for possible patterns along the gradients. We found that some chlorococcoid photobiont genera show patterns more similar to other, non-chlorococcoid, CCM-lacking photobionts (such as *Trentepohlia*) than to other chlorococcoid genera. Although they also contain CCMs, patterns in cyanolichens along the gradients also differed from CCM-containing chlorolichens, being in some ways more similar to photobionts that lack carbon-concentrating mechanisms. CCMs seem to be in part a factor determining chlorolichen distribution, analogous to photosynthetic mode in vascular plants, but further investigation is needed. Funding: NSF Dimensions of Biodiversity, NSF Division of Environmental Biology (DEB) and the Western Pennsylvania Conservancy.