



# Dead and Lichen It: Lichen Community Structure on Gravestones

M. S. Burmeister, C. S. DeLine, L. Greenwood-DeLine, J. A. Kimmey, K. M. Schrage, B. E. Wachholder, S. J. Meiners, and A. S. Methven  
 Department of Biological Sciences, Eastern Illinois University, Charleston, IL 61920



## Introduction

In central Illinois, where there are few natural rock exposures and only vestiges of oak-hickory savannas and prairies, the churchyard cemetery is a rich habitat for lichens. Within churchyard cemeteries, lichen community structure on gravestones is dependent on inherent qualities of individual stones, placement of gravestones, and the length of time a gravestone has been in position.

The principal aims of this study were 1) to determine lichen community structure on gravestones in a churchyard cemetery; 2) to determine if community structure differs on north- and south-facing aspects of gravestones; and 3) to determine if there is evidence for competitive interactions in lichen communities on gravestones.

## Materials and Methods

The locations of twenty-five, randomly selected dolomitic marble gravestones in the Shiloh Cemetery in Coles Co., Illinois, were recorded.

A 10 cm x 20 cm transparent sample grid containing 200, 1 cm<sup>2</sup> squares was centered 1 m above the ground on the north- and south-facing aspects of each gravestone.

The number of 1 cm<sup>2</sup> squares occupied by each lichen species in the sample grid was recorded as a measure of cover on the north- and south-facing aspect on each gravestone.

## Results

Eight lichen species were identified in gravestone plots: *Lecanora dispersa* (Ledi), *Myelochroa aurulenta* (Myau), *Myelochroa galbina* (Myga), *Phaeophyscia cernohorskyi* (Phce), *Physcia adscendens* (Phad), *Physciella chloantha* (Phch), *Physconia detersa* (Phde), and *Xanthoria fulva* (Xafu). Field characteristics of the four lichens identified as dominant species in gravestone plots are as follows:

*Lecanora dispersa* - Thallus crustose, dark brown to black, becoming endolithic; apothecia with white margins, pinkish-brown hymenium

*Physcia adscendens* - Thallus foliose, pale grey, lobes mostly less than 1 mm broad; soredia localized in ascending "hooded" lobe tips; white cilia on lobe margins; lower surface rhizinate, white

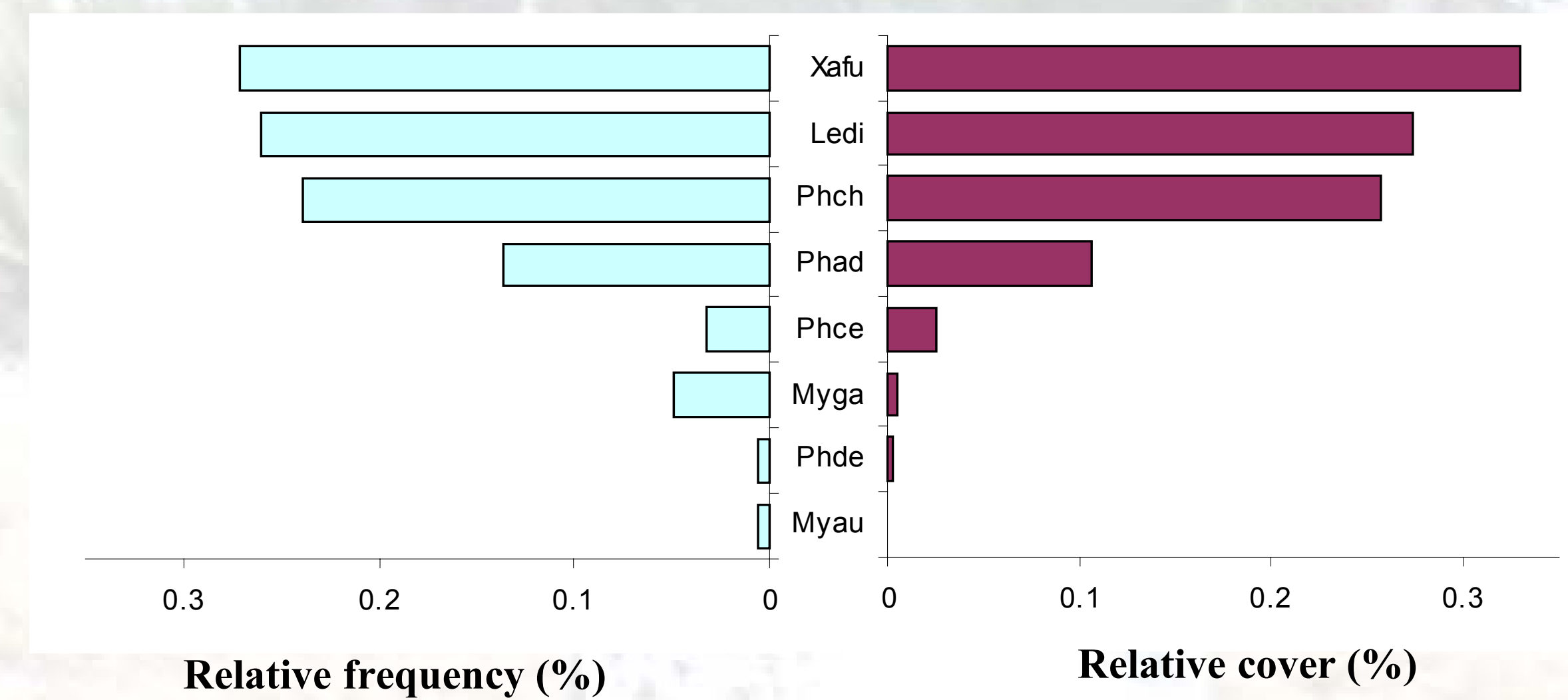
*Physciella chloantha* - Thallus foliose, grey, lobes more than 1 mm broad; soredia organized in irregular, marginal soralia; lower surface rhizinate, white to pale tan

*Xanthoria fulva* - Thallus foliose, yellow-orange, lobes less than 0.5 mm broad; soredia present on margins and lower surface of lobes; lower surface rhizinate, white



Dominant lichen species on gravestone.

## Lichen community structure



Lichen communities were composed of a total of eight species, with an average species richness of 3.68 (0.13 SE) species per headstone. Both frequency and cover based measures show clear dominance in lichen communities by three species, *Xanthoria fulva*, *Lecanora dispersa* and *Physciella chloantha*.

## Is there evidence for competition in lichen communities?

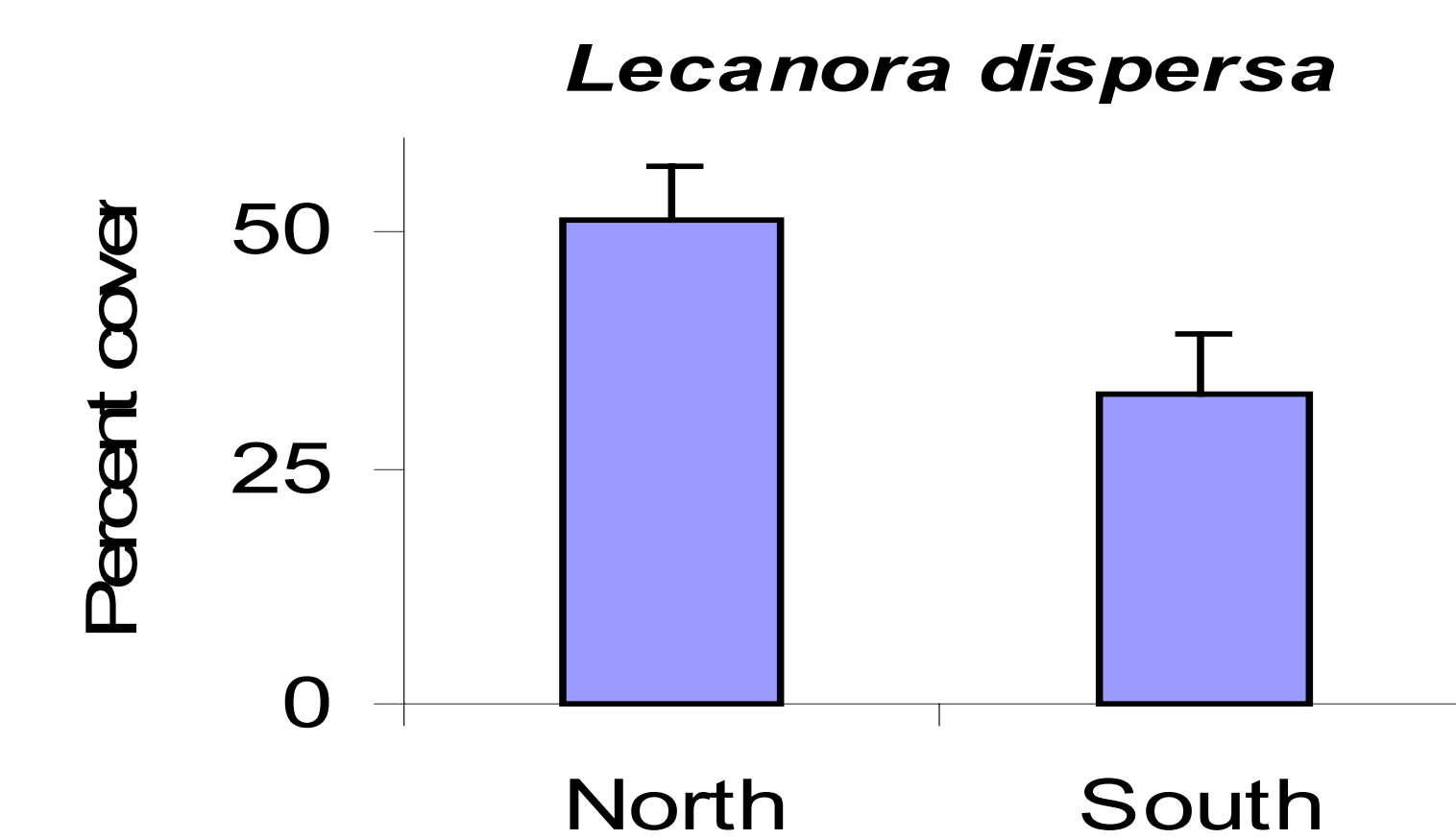
	Xafu	Ledi	Phch	Phad
Xafu	---	-0.15	-0.11	0.34*
Ledi		---	-0.10	0.09
Phch			---	-0.49**
Phad				---

Pearson correlation coefficients

These data show that only one pair of the dominant lichens shows a negative association – indicating the potential for competition in structuring this community. Both of these species have very similar thallus types and would presumably have similar ecological niches. Interestingly, one pair of foliose lichens had a positive association, indicating complementarity of habitat usage.

## Do north- and south-facing aspects of gravestones differ in community composition?

Analyses of the abundances of all eight species (Multivariate ANOVA) revealed significant differences between north- and south-facing aspects of gravestones. (*Aspect*,  $F_{16,84} = 5.24$ ,  $P < 0.001$ ).



Gravestones located in a low-lying area in the cemetery tended to be dominated by *Xanthoria fulva*. Because of large changes in community composition associated with a topographic gradient in the cemetery, it was not possible to isolate individual species' responses to gravestone aspect. *Lecanora dispersa* showed a nearly significant response to aspect ( $P=0.056$ ) and appears to have been important in the MANOVA.

## Future Studies

Determine whether nitrogen enrichment is associated with foliose lichens that are deeply pigmented such as *Xanthoria fulva*.

Determine the influence of topography on lichen community structure on gravestones.

