Main Content

My lab studies the ecology and physiology of the trait vegetative desiccation tolerance (DT) in mosses. Desiccation tolerance (DT) is the ability of an organism or structure to survive drying in equilibration with dry air, and among plants is most well developed among the bryophytes. In my lab, various species of mosses are cultured and bred, with experiments on DT normally based on single clonal lines. We are interested in determining the instrinsic ecological strategy of DT employed by a species; this strategy resides along an inducibility gradient, from weakly inducible to nearly constitutive. Current experimental topics include the the phenology of DT for both sporophytes and shoots, the linkage of DT to life phase, methods of drying plants for optimal induction of DT, and the influence of rate of rehydration on DT. In essence, my lab investigates how the four factors of desiccation tolerance, (i) the rate of drying, (ii) the equilibrating relative humidity experienced, (iii) the duration spent in the dried state, and (iv) the rate of rehydration, affect the capacity of a plant to tolerate desiccation and influence fitness.

Recent research highlights include the first demonstration that the model moss *Physcomitrella patens* is desiccation tolerant by a Ph.D. student in my lab (2014), the first demonstration that different life phases of a single species exhibit different intrinsic strategies of DT (2016), showing how a prehydration treatment protects against low tissue water contents (2018), and a first illustration of how rate of drying influences low water content in mosses (2019).

Current funded projects include (1) an NSF grant exploring DT in the genus *Syntrichia*, (2) a US Golf Association grant exploring stress effects on a moss that inhabits golfing greens, and (3) a floristic project for Grand Staircase Escalante National Monument. Prospective graduate students should have a background in bryophytes and an interest in moss ecophysiology.

Selected Publications

Stark, L. R., J. C. Brinda, and J. L. Greenwood. 2022. *How to dry a bryophyte: a review and experimental test of four methods to induce desiccation tolerance*. Bryologist 125: 1-22. doi: 10.1639/0007-2745-125.1.001

Slate, M. L., J. C. Brinda, K. K. Coe, J. L. Greenwood, and **L. R. Stark**. 2021. *Prehydration mitigates damage accrued from prolonged periods of desiccation in cultured shoot apices of Syntrichia ruralis*. Journal of Bryology 43: 138–149. published online 12-21-2020, doi: 10.1080/03736687.2020.1833157

Coe, K. K., J. L. Greenwood, M. L. Slate, T. A. Clark, J. C. Brinda, K. M. Fisher, B. D. Mishler, M. A. Bowker, M. J. Oliver, S. Ebrahimi, and **L. R. Stark**. 2021. *Strategies of desiccation tolerance vary across life phases in the moss Syntrichia caninervis*. American Journal of Botany (invited special edition, "Life Without Water") 108: 249–262, doi: 10.1002/ajb2.1571

Greenwood, J. L., **L. R. Stark**, and L. P. Chiquoine. 2019. *Effects of rate of drying, life history phase, and ecotype on the ability of the moss Bryum argenteum to survive desiccation events and*

the influence on conservation and selection of material for restoration. Frontiers in Ecology and Evolution, published online 10-18-2019, doi: 10.3389/fevo.2019.00388

Castetter, R. C., D. N. McLetchie, S. E. Eppley, and **L. R. Stark**. 2019 *Sex ratio and sex expression in an urban population of the silver moss, Bryum argenteum*. Journal of Bryology 41: 227–235, DOI: 10.1080/03736687.2019.1610617

Selected Awards

Multiple Sullivant Awards (2014, 2016, 2018), presented annually for the outstanding paper published in The Bryologist, with the latest paper "*Ecology of desiccation tolerance in bryophytes: a conceptual framework and methodology"* (2017).