

**The New England Botanical Club  
Graduate Student Research Awards  
2017 AWARD WINNER**

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**Plant carbon gain and water loss strategies as drivers for the  
maintenance of diversity: A novel approach using leaf carbon and  
oxygen stable isotopes**

How different species assemble into communities and what maintains species diversity over time are central questions in plant ecology. These questions have been explored and at least partially attributed to different biotic interactions, including interspecific competition, pollination, and herbivory. Another potentially critical factor for maintaining diversity in natural communities is how species differentially acquire and use resources through space and time. I will test for resource strategies pertaining to carbon gain and water loss in an old field community in Ithaca, New York. This work will use the carbon isotope composition ( $\delta^{13}\text{C}$ ) in combination with the oxygen isotope composition ( $\delta^{18}\text{O}$ ) of leaves as an integrated measure of a plant's carbon gain and water loss strategy.  $\delta^{13}\text{C}$  of leaves integrates the long-term supply and demand of carbon dioxide, and  $\delta^{18}\text{O}$  of leaf cellulose integrates the evaporative conditions of the leaf (i.e., the rate of water loss) at the time of cellulose production. Therefore, the combination of these two integrated values describes a plant strategy or efficiency in terms of carbon gain and water loss over the lifetime of the leaf. Variation in  $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$  among species would indicate fundamental differences in carbon and water use strategies that could provide a physiological basis for the maintenance of diversity.

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The New England Botanical Club offers each year up to \$3,000 total in support of botanical research to be conducted by graduate students. The awards are made to stimulate and encourage botanical research on the New England flora, and to make possible visits to the New England region by those who would not otherwise be able to do so. It is anticipated that two awards will be given, although the actual number and amount of awards will depend on the proposals received. The awards are given to the graduate student(s) submitting the best research proposal dealing with systematic botany, biosystematics, plant ecology, or plant conservation biology.