

# INVESTIGATING THE FUNCTIONAL AND ARCHITECTURAL DIVERSITY OF LEAF VENATION NETWORKS

Ilaine Silveira Matos , Mickey Boakye, Monica Antonio, Sonoma Carlos, Ashley Chu, Miguel A. Duarte, Andrea Echevarria, Adrian Fontao, Lisa Garcia, LeeAnn Huang, Breanna Carrillo Johnson, Shama Joshi, Diana Kalantar, Srinivasan Madhavan, Samantha McDonough, Izzi Niewiadomski, Nathan Nguyen, Hailey Jiyeon Park, Caroline Pechuzal, James Rohde, Roshni Sahu, Meg Scudder, Satvik Sharma, LeeDar Sneor, Jason To, Bradley Vu, Natalie Vuong, Nicole Yokota, Luiza Aparecido, Holly Forbes, Mark Fricker, and Benjamin Wong Blonder 

## Study description

Plants exhibit a great diversity of leaf venation network architectures, which may reflect trade-offs among multiple leaf functions. Here, a team of 20 undergraduate and postgraduate students led by Dr. Matos collected samples from the University of California Botanical Garden to describe this diversity. The team generated a dataset of 31 functional and several architectural leaf venation traits, sampled from a phylogenetically diverse set of 122 species. This dataset is being used for the identification of venation architecture-function trade-offs and to elucidate the evolutionary processes that resulted in such a diversity of networks.

Matos, I. S., M. Boakye, M. Antonio, S. Carlos, A. Chu, M. A. Duarte, A. Echevarria, A. Fontao, L. Garcia, L. Huang, B. C. Johnson, S. Joshi, D. Kalantar, S. Madhavan, S. McDonough, I. Niewiadomski, N. Nguyen, H. J. Park, C. Pechuzal, J. Rohde, R. Sahu, M. Scudder, S. Sharma, L. Sneor, J. To, B. Vu, N. Vuong, N. Yokota, L. Aparecido, H. Forbes, M. Fricker, and B. W. Blonder. 2025. Investigating the Functional and Architectural Diversity of Leaf Venation Networks. *Bull Ecol Soc Am* 106(1):e02206. <https://doi.org/10.1002/bes2.2206>

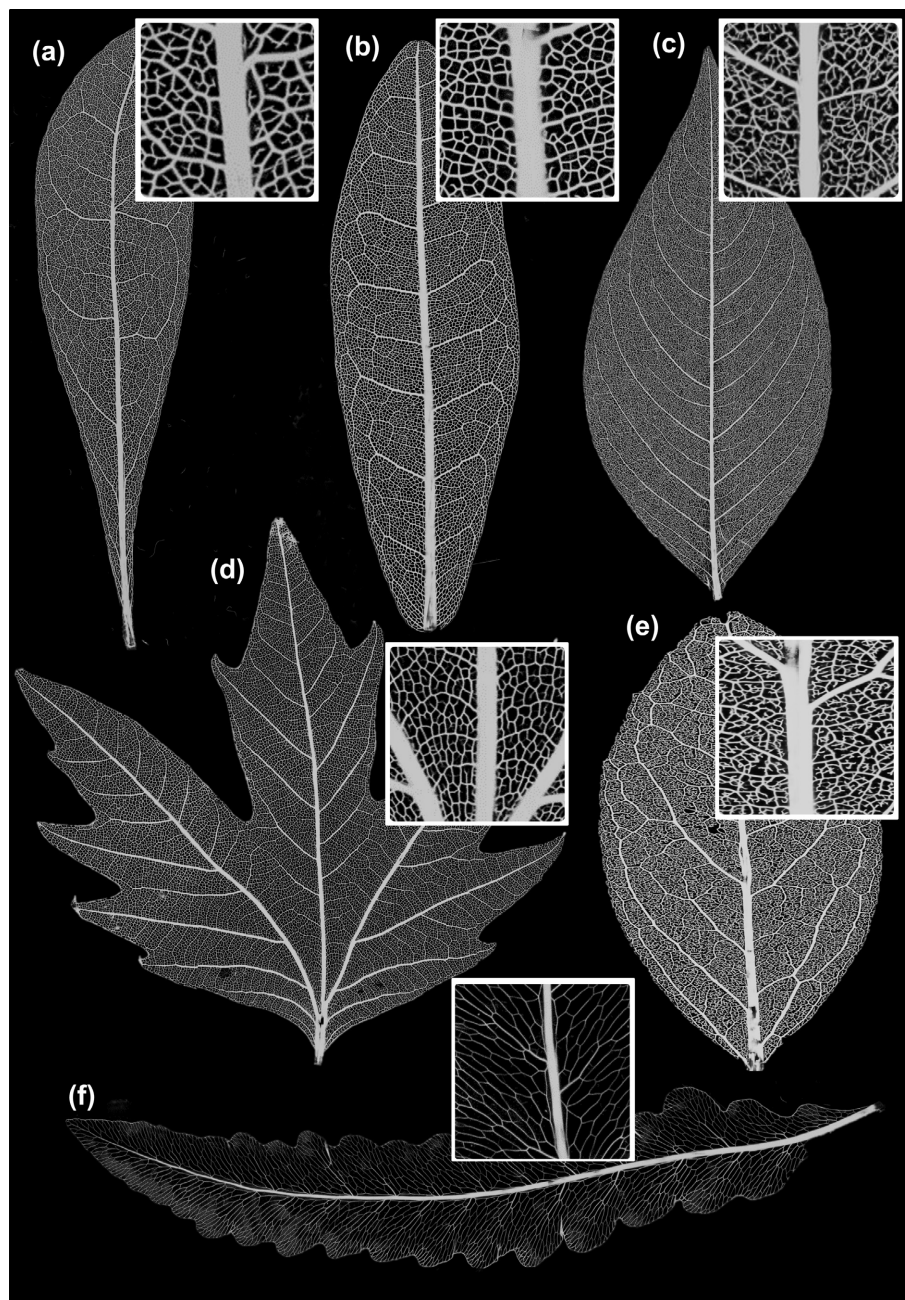


Photo I. Examples of the diversity of leaf venation networks architectural designs across plant species. (a) *Myrica rubra* (Myricaceae); (b) *Aextoxicon punctatum* (Aextoxicaceae); (c) *Polygonum virginianum* (Polygonaceae); (d) *Platanus orientalis* (Platanaceae); (e) *Phillyrea latifolia* (Oleaceae); (f) *Onoclea sensibilis* (Onocleaceae). Photo credit: Andrea Echevarria.

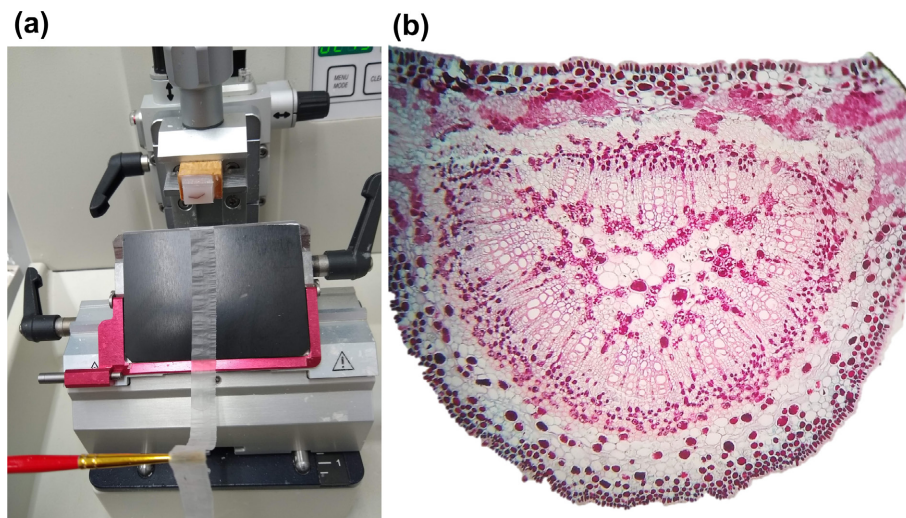


Photo 2. Obtaining leaf venation anatomical traits. (a) A microtome used to cut very thin slices (< 10 micrometers) of leaves, previously embedded in paraffin blocks; (b) A leaf cross-sectional image observed under a microscope (10× objective). Photo credit: Ilaine Silveira Matos.

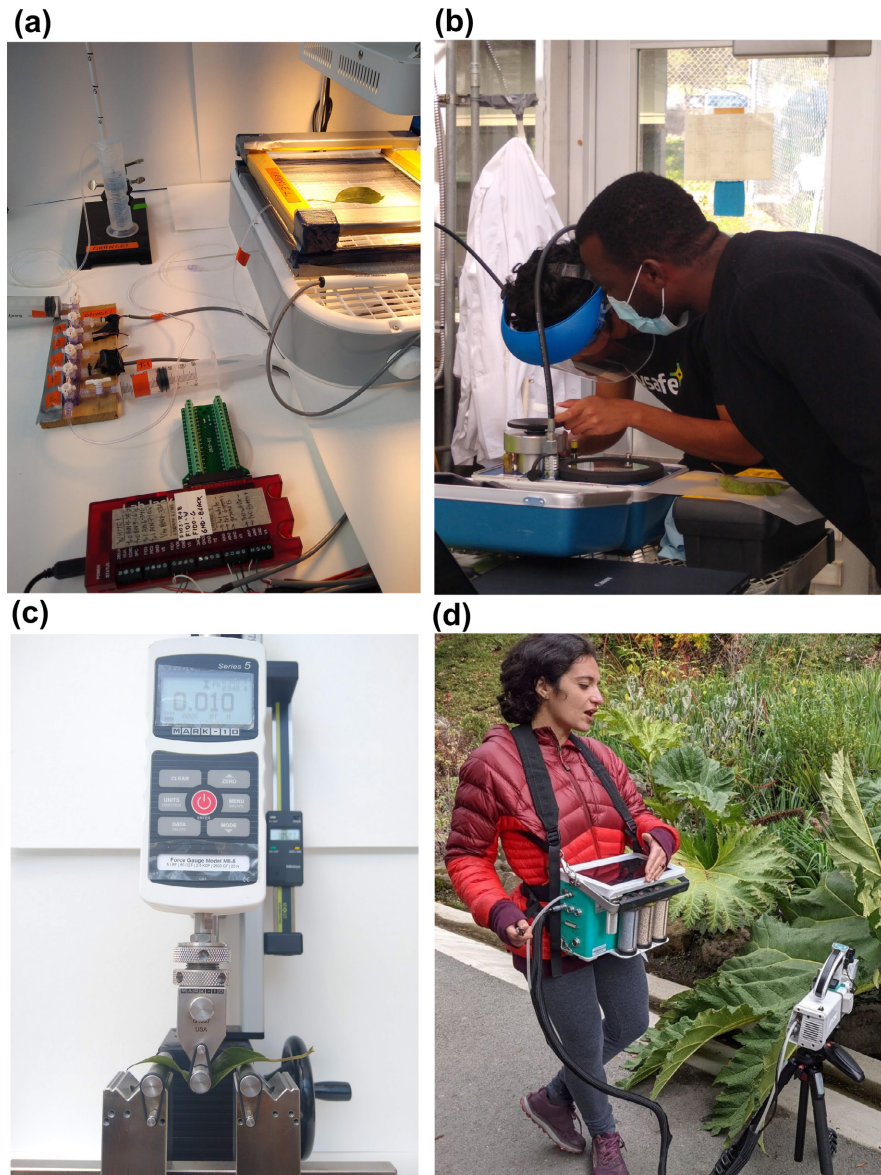


Photo 3. Obtaining leaf venation functional traits. (a) An evaporative flux apparatuses used to measure leaf hydraulic conductance, which describes how efficiently water flows across a leaf; (b) Student research team members using a pressure chamber to measure leaf water potential, which describes the degree of leaf dehydration; (c) An universal testing machine used to obtain leaf modulus of elasticity, which describes how elastic the leaf is in response to bending pressures; (d) a research team member using a leaf gas exchange machine to measure leaf stomatal conductance, a measure of much water the leaf loses through transpiration.

These photographs illustrate the article “Leaf architecture and functional traits for 122 species at the University of California at Berkeley Botanical Garden” by Ilaine Silveira Matos et al., published in *Ecology*. <https://doi.org/10.1002/ecy.4436>