

Post-doctoral opening at the interface of ecology, evolution, development, and biogeography



The Givnish lab (<http://givnishlab.botany.wisc.edu/Welcome.html>) seeks a post-doctoral fellow for an NSF-funded study of phylogenomics, historical biogeography, species diversification, and floral eco-evo-devo in *Calochortus* (Liliaceae).

Calochortus, with ca. 80 species in western North America and Central America, is a charismatic genus of bulbous herbs centered in the California Floristic Province. *Calochortus* has undergone extensive radiations in floral form, habitat, and substrate preference, with recurrent evolution of four floral syndromes (mariposas, cat's ears, star tulips, fairy lanterns). Most species are endemic to narrow geographic areas, and 25% occur on or are restricted to serpentine. Previous phylogenetic analyses of *Calochortus*, based on a few chloroplast loci, identified seven major, geographically cohesive clades that appear to exhibit parallel adaptive radiations in floral form and habitat (Patterson & Givnish 2004). But these analyses lacked the data needed to fully resolve relationships and screen for reticulate evolution.

My colleagues – including Chelsea Specht and Susan Strickler at Cornell, and Alan and Emily Lemmon at Florida State – and I plan to develop *Calochortus* as a model for macro- and microevolutionary studies by (1) sequencing hundreds of low-copy nuclear loci and whole plastid genomes for all species to derive fully resolved, strongly supported phylogenies and screen for reticulate evolution; (2) reconstructing trait evolution, habitat and climatic niche shifts, and historical biogeography, including a possible ring species; and (3) conducting floral eco-evo-devo studies that examine the genomic, developmental, and ecological bases for the cat's-ear and fairy-lantern floral syndromes. We plan to integrate phylogeny, development, genomics, and biogeography to understand evolutionary patterns in an iconic North American genus.

The UW-Madison post-doc will make several key contributions to this exciting research. (S)he will have responsibility for (a) collecting new DNA samples and vouchers; (b) processing these and samples in hand for hybrid DNA enrichment and next-generation sequencing; (c) helping assemble, align, and analyze the resulting sequences to produce nuclear and plastome phylogenies, and calibrate these against time; (d) helping evaluate patterns of conflict among phylogenies to infer patterns of reticulate evolution; (e) using these phylogenies to help reconstruct patterns of morphological, ecological, and geographic evolution; and (f) helping analyze potential drivers of net rates of species diversification.

The post-doc will work with the PI and colleagues to analyze data, run analyses, interpret data, and write papers. There will also be opportunities to help advise and collaborate with a graduate student conducting a study of developmental allometry in fairy lantern species and relatives, and to cross-train and collaborate with members of the Specht and Strickler labs, which will assume primary responsibility for the genomic components of this project. This position provides exciting opportunities for advanced training in areas at the interface of ecology, evolution, biogeography, and development, including morphological and molecular evolution, pollination biology, developmental genetics, genomics, and comparative phylogenetics. The PI is an experienced mentor who strongly supports his students and post-docs to advance their careers and achieve professional positions in academia, government agencies, and NGOs.

The ideal candidate would be a creative, ambitious, and collaborative person, trained in molecular phylogenetics and historical biogeography, and skilled in the use of analytical programs, data pipelines, work flows, and data sharing and archiving. (S)he should have initiative, perseverance, and good judgment, be a clear thinker, and have strong organizational and writing skills.

Salary will initially be \$47.5K per year, starting in fall 2019 or spring 2020 and renewable for a second year contingent on performance. UW-Madison provides a high-quality work environment and excellent benefits (<https://working.wisc.edu/>), and the UW Department of Botany is one of the leading research groups in plant sciences in the world. Madison is an exciting community with many cultural amenities and possibilities for outdoor recreation. It is rated as one of the most pleasant places to live in the US (<https://livability.com/best-places/top-100-best-places-to-live/2019/wi/madison>).

To apply, please submit a CV, a one-page summary of your research goals, and a list of three references with contact information to givnish@wisc.edu with the subject line "Calochortus post-doc".