

Chris Talbot – Prior Research Experience, University of Oregon Ecology & Evolution PhD

Institution: University of Michigan

PI: Gideon Bradburd (Assistant Professor)

Dates: August 2024-Present, full-time

Project: Inferring the geographic history of ancestors of genomic samples using tree sequences

Goal: Expand the use of tree sequences for evolutionary inference, ensure well-documented and accessible code and academic software, and visualize inference results for a general audience.

Responsibilities:

- Produce an interactive map dashboard for visualizing inferences across space and time using React, TypeScript, and deck.gl frameworks with Python for data processing
- Use *SLiM* 4.3 simulations and the *tskit* Python API to assess the impact of over 100 spatial and temporal sampling schemes on inference accuracy
- Evaluate the method for potential optimizations, enhancements, or fixes – for example, fixed a bug in underlying C code that prevented the package from running in *RStudio*

Institution: University of Michigan

PI: Marjorie Weber (Associate Professor, Associate Chair for Graduate Studies)

Dates: August 2022-Present, part-time, full-time over summers and after December 2023

Project: Investigating spatiotemporal dynamics and drivers of floral color in co-flowering assemblages of wildflowers using community science and computer vision

Goal: Determine whether flowers of a color bloom together in time and space, thereby assessing the potential evolutionary drivers and ecological function of floral color as a reproductive trait.

Responsibilities:

- Completed independent research for an honors thesis (highest honors received) and first-author manuscript (in preparation) asking if flowers of a color bloom together
- Developed a Python program with graphical user interface to facilitate the rapid collection of mean floral color data from thousands of iNaturalist images
- Used generalized linear mixed models to assess the relationships between floral color, spatial and temporal distribution, and phylogenetic relationships between 1000+ species
- Found that co-flowering assemblages of wildflowers with more close relatives display more disparate floral colors, suggesting floral color plays a role in the generation and/or maintenance of species-level biodiversity
- Communicated results through presentations, including two international conferences

Institution: University of Michigan

PI: Marjorie Weber (Associate Professor, Associate Chair for Graduate Studies)

Dates: May 2024-August 2024, full-time

Project: Investigating the prevalence and function of domatia-like structures on Northern Michigan ferns

Goal: Assess the function and ecological impacts of structures on Michigan ferns resembling domatia, which had not yet been well-documented or researched

Responsibilities:

- Assisted with fieldwork for a lab undergraduate project, including identifying study sites, designing treatment and control methods, and executing treatment and control on-site
- Assisted with lab work for analysis, including rigorous scanning of ferns for domatia-like structures, mites, ants, and potential interactions between pseudodomatia, mites, and ants
- This work confirmed that the domatia-like structures on ferns serve similar functions to domatia on angiosperm leaves, including housing mites and increasing leaf biodiversity

Institution: University of Michigan

PI: Marjorie Weber (Associate Professor, Associate Chair for Graduate Studies)

Dates: August 2022-December 2023, part-time, full-time over summers

Project: Investigating the form, function, and frequency of calcium oxalate crystals in riverbank grape (*Vitis riparia*)

Goal: Remove pigment from grape leaves to study the quantity and diversity of calcium oxalate crystals within with the aim of investigating potential functions of those crystals.

Responsibilities:

- Ran chemical protocol for processing and “clearing” grape leaves for later analysis, including time-sensitive work with hazardous chemicals

Institution: University of Michigan

PI: Roberto Márquez (now Assistant Professor at Virginia Tech)

Dates: August 2021-November 2022, part-time, full-time over summer

Project: Developing genetic modification techniques in non-model organisms (poison-dart frogs) to study the genomic basis of aposematism

Goal: Develop comprehensive pipelines for breeding, rearing, genetically modifying, and raising poison-dart frogs in the lab for future studies of the development and basis of aposematism.

Responsibilities:

- Developed protocol for performing CRISPR-Cas9 gene knockouts in poison-dart frogs, including CRISPR-Cas9 solution design and production, manual egg dejellying technique development, and injection of fresh embryos with solutions using microinjector
- Assisted in the development and execution of care, breeding, and rearing protocols for 100+ poison-dart frogs in the lab
- Performed biogeographic analyses of the distribution of poison-dart frogs in South America, examining patterns of aposematism and color development