

RYAN FOLK

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 Florida Museum of Natural History
 Dickinson Hall, University of Florida
 Gainesville, FL 32611

POSITIONS HELD:

<i>Postdoctoral associate</i>	University of Florida	2017 –
<i>Postdoctoral fellow</i>	NSF (courtesy appt. at UF)	2015 – 2017
<i>Graduate research assistant</i>	The Ohio State University	2015
<i>Graduate teaching associate</i>	The Ohio State University	2012 – 2014
<i>Graduate fellow</i>	The Ohio State University	2010 – 2012, 2014 – 2015

EDUCATION:

Ph.D., Evolution, Ecology, and Organismal Biology, The Ohio State University, 2010-2015 (4 yr 10 mo). Dissertation: Biosystematics of the Genus *Heuchera* (Saxifragaceae).

B.S., Biology, *Summa cum Laude*, University of Akron, 2006-2010 (3 yr 11 mo), GPA 3.994. Minor, Chemistry.

RESEARCH INTERESTS:

Phylogenomics and biodiversity informatics, particularly empirical and informatics approaches to: (1) integration of niche modeling in a phylogenetic framework using the flowering plant clade Saxifragales; (2) phenotypic and phylogenomic approaches to understanding the evolution and success of nitrogen-fixing symbioses; (3) systematics of the plant genus *Heuchera* with a focus on detection of evolutionary processes using phylogenomic data.

RESEARCH GRANTS RECEIVED:

- 2017, Sr. Pers.: Systems Biology Research to Advance Sustainable Bioenergy Crop Development (DOE, \$7,300,000). Phylogenomic discovery and engineering of nitrogen fixation into the bioenergy woody crop poplar. Press releases [here](#) and [here](#).
- 2017, co-PI: Research Opportunity Fund (University of Florida, \$67,226, PI D. Soltis). Using the tree of life to develop novel approaches for public engagement in science.
- 2017, PI: XSEDE start-up allocation (50,000 Stampede system units, approx. \$1,739 equivalent value); co-PI on a second allocation with the same dimensions.
- 2017, co-PI: Biodiversity Institute Seed Grant (University of Florida, co-funded with the University of Florida Informatics Institute, \$40,000, PI D. Soltis). An integrative resource for trait-based evolutionary synthesis: Uncovering hidden enablers of nitrogen fixation in the rosids. *Writing lead*.
- 2016, co-PI: Genetics Institute Pilot Grant (University of Florida, \$49,727, PI R. Guralnick) Next Generation Bioinformatics—Tools for rapid mining and assembly from genomic repositories.
- 2015, PI: Post-Doctoral Fellowship in Biology (NSF, \$138,000). Niche biology in deep time: New methods for ancestral niche reconstruction applied to the Saxifragales.
- 2014, co-PI: Doctoral Dissertation Improvement Grant (NSF, \$15,502; PI J. Freudenstein)

Investigating the impact of hybridization on diversification: A case study in the plant genus *Heuchera*. *Writing lead*.

2013, PI: American Society of Plant Taxonomists Research Grant (\$800)

2013, PI: AGGRS Alumni Grant (The Ohio State University, \$1,900)

2012, PI: R. L. Stuckey Endowment Fund (The Ohio State University, \$1,500)

2011, PI: Beatley Fund (The Ohio State University, \$1,200)

2008, 2009, PI: Dr. Paul Acquarone Award in Plant Sciences (University of Akron, \$450 each)

RESEARCH GRANTS IN PROCESS:

2017, co-PI: ABI Development: aTRAM: Novel tools for enabling community mining and fast assembly of genomic datasets (NSF ABI, \$592,586)

MISCELLANEOUS PERSONNEL ROLES:

2017, foreign collaborator: Major international joint research project (NSFC of P.R. China, 3.1066 million yuan RMB = ~\$450,000; PI T. Yi) The global diversification of *Rosales* in space and time.

PUBLICATIONS:

Folk, R.A.*, J.C. Ginori*[†], D.E. Soltis, and A.J. Floden. Accepted. Integrative identification of incipient lineages in *Heuchera longiflora* (Saxifragaceae). *Botanical Journal of the Linnean Society*.

Stubbs, R.L., **R.A. Folk**, C. Xiang, D.E. Soltis, and N. Cellinese. Accepted. Pseudo-parallel patterns of disjunctions in an Arctic-alpine plant lineage. *Molecular Phylogenetics and Evolution*.

Folk, R.A., M. Sun, S.A. Smith, P.S. Soltis, R.P. Guralnick, and D.E. Soltis. 2018 [in press]. Challenges of comprehensive taxon sampling in comparative biology: Wrestling with rosids. Invited review, *American Journal of Botany* special Tree of Life issue.

Folk, R.A., P.S. Soltis, R.P. Guralnick, and D.E. Soltis, and R.P. Guralnick. 2018 [in press]. New prospects in the detection and comparative analysis of hybridization. Invited review, *American Journal of Botany*, special Tree of Life issue.

Zhang, R., X. Gong, and **R.A. Folk**. 2017. Evidence for continual hybridization rather than hybrid speciation between *Ligularia duciformis* and *L. paradoxica* (Asteraceae). *PeerJ* 5:e3884.

García, N., **R.A. Folk**, A.W. Meerow, S. Chamala, M.A. Gitzendanner, R.S de Oliveira, D.E. Soltis, and P.S. Soltis. 2017. Deep reticulation and incomplete lineage sorting obscure the diploid phylogeny of rain-lilies and allies (Amaryllidaceae tribe Hippeastreae). *Molecular Phylogenetics and Evolution*. 111: 231–247.

Freudenstein, J.V., M.B. Broe*, **R.A. Folk***, and B.T. Sinn*. 2017. Biodiversity and the species concept – Lineages are not enough. *Systematic Biology* 66(4): 644–656.

Folk, R.A., J.R. Mandel, and J.V. Freudenstein. 2017. Ancestral gene flow and parallel organellar genome capture result in extreme phylogenomic discord in a lineage of angiosperms. *Systematic Biology* 66(3): 320–337.

Folk R.A. and P.J. Alexander. 2015. Two new species, *Heuchera soltisii* and *H. inconstans*, with further taxonomic notes for the western group of *Heuchera* section *Heuchera* (Saxifragaceae). *Systematic Botany* 40(2): 489–500.

Folk, R.A., J.R. Mandel, and J.V. Freudenstein. 2015. A protocol for targeted enrichment of intron-containing sequence markers for recent radiations: A phylogenomic example

with genomic resources from *Heuchera* (Saxifragaceae). *Applications in Plant Sciences* 3(8): 1500039. Press release [here](#).

- Folk, R.A.** and J.V. Freudenstein. 2015. "Sky islands" in the eastern U.S.A.? – Strong phylogenetic structure in the *Heuchera parviflora* group (Saxifragaceae). *Taxon* 64(2): 254–271.
- Folk, R.A.** and J.V. Freudenstein. 2014. Phylogenetic relationships and character evolution in the genus *Heuchera* L. (Saxifragaceae) on the basis of nuclear loci. *American Journal of Botany* 101(9): 1532–1550.
- Folk, R.A.** and J.V. Freudenstein. 2014. Revision of *Heuchera* section *Rhodobeuchera* subsections *Hemsleyanae* and *Rosendahliae* subsect. nova (Saxifragaceae). *Systematic Botany* 39(3): 850–874.
- Folk, R.A.** 2013. *Heuchera lakelae* (Saxifragaceae), a new species from the Sierra La Marta and Sierra Coahuilón, Coahuila and Nuevo León, Mexico. *Phytotaxa* 124(1): 37–42.

MANUSCRIPTS IN PROCESS:

- Folk, R.A.**, C.J. Visger, D.E. Soltis, P.S. Soltis, and R.P. Guralnick. In revision. Geographic range dynamics drove ancient hybridization in a lineage of angiosperms. *American Naturalist*. Preprint deposited at <https://doi.org/10.1101/129189>.
- Zhang N.-N., Y.-P Ma., **R.A. Folk**, J.-J. Yu, Y.-Z. Pan, and X. Gong. Submitted. Maintenance of species boundaries in three sympatric *Ligularia* (Senecioneae, Asteraceae) species. *Journal of Integrative Plant Biology*.
- Allen, J.M., R. LaFrance, **R.A. Folk**, K. Johnson, and R.P. Guralnick. Submitted. aTRAM 2.0: An improved, flexible locus assembler for NGS data. *Evolutionary Bioinformatics*.
- Schuette, S., **R.A. Folk**, J.T. Cantley, and C.T. Martine. Submitted. The hidden *Heuchera*: How science Twitter uncovered a globally imperiled species in Pennsylvania, USA. *PhytoKeys*.

BOOK CHAPTERS AND OTHER NON-PEER-REVIEWED CONTRIBUTIONS:

- Folk, R.A.** and R.L. Stubbs. [In review] Treatment of Saxifragaceae. In R.F.C. Naczi, revised *Manual of Vascular Plants of the Northeastern United States and Adjacent Canada*.
- Folk, R.A.** and A.S. Weakley. Treatment of *Heuchera*. In A.S. Weakley. *Flora of the Southern and Mid-Atlantic States*.

**equally contributing authors*

†*undergraduate author*

AWARDS:

- 2017, Travel award, Florida Museum of Natural History (\$1,000)
- 2015, Travel award for the Phylogenomics Symposium and Software School, Ann Arbor, Michigan (\$500).
- 2014, George R. Cooley Award for best contributed paper in plant systematics (“Sky islands” in the eastern US? – Strong phylogeographic structure in the *Heuchera parviflora* group (Saxifragaceae)”; American Society of Plant Taxonomists, \$500)
- 2010, Susan L. Huntington Distinguished University Fellowship (3 yr; \$64,800)
- 2010, Young Botanist Award (Botanical Society of America)
- 2006 – 2010, Dean’s List (The University of Akron)

DEPARTMENTAL SEMINARS:

- Folk, R.A.** 2018. Large-scale approaches to understanding niche evolution and symbiosis in the flowering plants. *University of Florida*.
- Folk, R.A.** 2017. Large-scale approaches to understanding niche evolution and symbiosis in the flowering plants. *San Diego State University*.
- Soltis, D.E.*, P.S. Soltis*, and **R.A. Folk***. 2017. The Tree of Life and the evolution of nitrogen-fixing symbioses. *New York Botanical Garden*.
- Folk, R.A.** 2017. Hybridization and diversification: Extreme phylogenomic discord in *Heuchera*. *Kunming Institute of Botany* (P.R. China).
- Folk, R.A.** 2017. Hybridization and diversification: Extreme phylogenomic discord in *Heuchera*. School of Integrative Plant Science, *Cornell University*.
- Folk, R.A.** 2017. Hybridization and diversification: Extreme phylogenomic discord in *Heuchera*. Department of Biology, *San Francisco State University*.
- Folk, R.A.** 2017. Hybridization and diversification: Extreme phylogenomic discord in *Heuchera*. Department of Biological Sciences, *University of Alabama*.
- Folk, R.A.** 2016. Hybridization and diversification: Extreme phylogenomic discord in *Heuchera*. Department of Biological Sciences, *Texas Tech University*.
- Folk, R.A.** 2016. New sequencing strategies for radiations ancient and recent—An explicit test of reticulate evolution in the *Heuchera* clade (Saxifragaceae). *Royal Botanic Garden Edinburgh* (United Kingdom).
- Folk, R.A.** 2015. Phylogenomics of *Heuchera*—Organellar capture and trait evolution. Florida Museum of Natural History, *University of Florida*.
- Folk, R.A.** 2014. Phylogenetic relationships in *Heuchera* (Saxifragaceae) based on ribosomal and low-copy nuclear loci. Department of Evolution, Ecology, and Organismal Biology, *The Ohio State University*.

**co-presented/ tag-team*

INVITED CONFERENCE PRESENTATIONS:

- Folk, R.A.***, R.P. Guralnick, P.S. Soltis, D.E. Soltis, J.M. Allen*. 2017. Data assembly and post-processing in aTRAM for museum phylogenomics. International Botanical Congress.
- Folk, R.A.**, C.J. Visger, R.P. Guralnick, D.E. Soltis, P.S. Soltis. 2017. Assessing ancestral niche suitability and geographic range dynamics as drivers of hybridization in *Heuchera* (Saxifragaceae). International Botanical Congress.
- Soltis, D.E.*, R.P. Guralnick, S.R. Manchester, J.M. Allen, M. Kirst, J. Oliverio, and **R.A. Folk***. Uncovering hidden enablers of nitrogen fixation in a major clade of flowering plants. Symposium: Collaborations in Biodiversity Research, University of Florida.

CONTRIBUTED CONFERENCE PRESENTATIONS:

- García N., A.W. Meerow, S. Arroyo-Leuenberger, J. Dutilh, R.S. Oliveira, W.S. Judd, **R.A. Folk**, D.E. Soltis, & P.S. Soltis. 2017. Propuesta de clasificación genérica de Amaryllidaceae tribu Hippeastreae basada en su filogenia (“Proposal of a generic classification of Amaryllidaceae tribe Hippeastreae based on their phylogeny”). Argentinean Botanical Society meeting.
- Allen, J.M., R. LaFrance, **R.A. Folk**, K. Bell, K. Johnson, R.P. Guralnick. 2017. aTRAM 2.0: Targeted assembly of loci from both reduced and whole genome NGS data. Evolution meeting.

- Soltis, D.E., P.S., Soltis, J. Beach, A. Stewart, A. Thompson, J. Cavner, C.J. Grady, S. Smith, J. Fortes, **R.A. Folk**, M. Gitzendanner. 2017. Biotaphy—Connecting resources to enable large scale biodiversity analyses. International Botanical Congress.
- Stubbs, R.L., **R.A. Folk**, D.E. Soltis, N. Cellinese. 2017. Investigating the Sierra Nevada-Rocky Mountain disjunction in *Micranthes* (Saxifragaceae) with a target enrichment approach. Botanical Society of America meeting.
- Naranjo, A., **R.A. Folk**, P.S. Soltis, D.E. Soltis. 2017. *Dicerandra*: Understanding ancestral niches of a narrow endemic. Botanical Society of America meeting.
- Soltis, D.E., P.S., Soltis, J. Beach, A. Stewart, A. Thompson, J. Cavner, C.J. Grady, S. Smith, J. Fortes, **R.A. Folk**, M. Gitzendanner. 2017. Biotaphy: Mobilizing and integrating big data in studies of spatial and phylogenetic patterns of biodiversity. Botanical Society of America meeting.
- Folk, R.A.**, Stubbs, R.L., Cellinese, N., Mort, M.E., Soltis, P.S., Soltis, D.E., Guralnick, R.P. 2017. Dynamics of niche evolution in the Saxifragales. Botanical Society of America.
- Folk, R.A.**, Guralnick, R.P., Soltis, P.S., Soltis, D.E., Allen, J.M. 2017. Data assembly and post-processing in aTRAM for museum phylogenomics. Botanical Society of America meeting.
- Folk, R.A.**, C.J. Visger, R.P. Guralnick, D.E. Soltis, P.S. Soltis. 2017. Historical range dynamics drove hybridization in a lineage of angiosperms. Society of Systematic Biologists standalone meeting.
- Soltis, D.E., M. Sun, C. Germain-Aubrey; S. Smith; P.S. Soltis, Z. Chen, **R.A. Folk**, R.P. Guralnick. 2016. Wrestling with the rosids II: Too big to nail—Challenges in conducting comprehensive analyses in the angiosperms. Botanical Society of America meeting.
- Stubbs, R., **R.A. Folk**, D.E. Soltis, N. Cellinese. 2016. Specialized adaptations and restricted niche preferences of cold-adapted saxifrages (*Micranthes*, Saxifragaceae). Botanical Society of America meeting.
- Folk, R.A.**, C.J. Visger, R.P. Guralnick, D.E. Soltis, P.S. Soltis. 2016. Ancestral reconstruction of habitat shifts from ecological niche models of extant species: A pipeline with applications to ancestral hybridization in *Heuchera* (Saxifragaceae). Botanical Society of America meeting.
- García, N., A.W. Meerow; S. Chamala, M. Gitzendanner, R.S. Oliveira, **R.A. Folk**, D.E. Soltis, P.S. Soltis, 2016. Revisiting incongruence in the diploid phylogeny of Amaryllidaceae tribe Hippeastreae (Asparagales): Hybridization or incomplete lineage sorting? Botanical Society of America meeting.
- Folk, R.A.**, J.R. Mandel, J.V. Freudenstein. 2015. Phylogenomic approaches in the genus *Heuchera* (Saxifragaceae) elucidate deep reticulation and simultaneous mitochondrial and chloroplast capture. Botanical Society of America meeting.
- Folk, R.A.**, J.R. Mandel, J.V. Freudenstein. 2015. Protocol for targeted enrichment of intron-containing sequence markers for recent radiations: A phylogenomic example from *Heuchera* (Saxifragaceae). Botanical Society of America meeting.
- Folk, R.A.**, J.V. Freudenstein. 2014. “Sky islands” in the eastern US? – Strong phylogeographic structure in the *Heuchera parviflora* group (Saxifragaceae). Botanical Society of America meeting (Cooley Award winner).
- Folk, R.A.**, J.V. Freudenstein. 2013. Phylogenetic relationships in *Heuchera* (Saxifragaceae) based on ribosomal and low-copy nuclear loci. Botanical Society of America meeting.
- Folk, R.A.**, J.V. Freudenstein. 2012. Reticulate evolution and phylogenetic relationships in the genus *Heuchera* (Saxifragaceae). Botanical Society of America meeting.

**co-presented/ tag-team*

POSTERS:

- R.A. Folk**, D.E. Soltis, P.S. Soltis, R.P. Guralnick. 2017. Dynamics of niche evolution in the Saxifragales. Research Using Biological Collections (RUBC) PRFB Symposium.
- Tarullo, C., **R.A. Folk**, D.E. Soltis, P.S. Soltis, B. Drew. 2016. Using a supermatrix approach to explore historical biogeography, divergence times and phylogenetics of Saxifragales. Botanical Society of America meeting.

SCIENTIFIC WORKSHOP ORGANIZATION:

- 2017, Co-organizer and lecturer for Botanical Society of America iDigBio/BiotaPhy workshop: “Using Digitized Herbarium Data in Research; Applications for Ecology, Phylogenetics, and Biogeography”
- 2016, Co-organizer and lecturer for Botanical Society of America iDigBio workshop: “Using Digitized Herbarium Data in Research: A Crash Course”

INVITED WORKSHOPS:

- 2017, BCoN Workshop (Next-Generation Natural History Collections; Harvard University, Cambridge)
- 2017, FuturePhy SoTol (“State of the Tree of Life”; Field Museum, Chicago)

FORMAL TEACHING EXPERIENCE:

- 2018, UF, co-instructor, Taxonomy of Vascular Plants (undergraduate/graduate; BOT2710)
- 2016, UF, co-instructor, Principles of Systematics (graduate; BOT6726/ZOO6927)
- 2014, OSU, Graduate Teaching Assistant, Honors Evolution, Ecology, and Systematic (early undergraduate; BIO1114H)
- 2013, OSU, Graduate Teaching Assistant, EEOB (advanced undergraduate; EEOB3410: Ecology)
- 2012 – 2013, OSU, Graduate Teaching Assistant, CSLE (early undergraduate; BIO1114: Evolution, Ecology, and Systematics)

STUDENT RESEARCH MENTORSHIP:

OSU: 3 undergraduates

UF: 5 undergraduates, 1 high school student

Partial list: Joshua Gil (now at U Conn in graduate school), Julian Ginori (NSF REU, recipient of Botanical Society of America Young Botanist Award, UF Biology Undergraduate Assistant Award, now in Colorado on an internship), Jay Talati (UF SSTP high school summer program, now at Emory University in undergraduate), Tatyana Srybnykh (now a lab tech), Ian Cooney (now at University of Utah in graduate school), Amelia Krusell, Kaitlyn Robis (now a high school biology teacher)

Formal mentorship programs: REU mentor to one student (UF; 12 wk, 15 hr/wk); research mentor to a high school student under UF’s SSTP program (7 wk, 35 hr/wk).

SERVICE:

Peer reviews (~15/yr) for: *Molecular Ecology, Evolution, BMC Evolutionary Biology, BMC Plant Biology, Biology Letters, Taxon, American Journal of Botany, Heredity, PLoS One, PeerJ,*

Applications in Plant Science, Botanical Journal of the Linnaean Society, Systematic Botany, Botany Letters, Phytotaxa, Journal of Systematics and Evolution, Evolutionary Bioinformatics
 Grant reviews for: NSF (ad hoc reviews for the following DEB programs: 1. OPUS; 2. Population and Community Ecology), American Society of Plant Taxonomists (graduate student awards)
 Session chair: Macroevolution (Botanical Society of America, 2017 meeting)

PUBLIC OUTREACH:

2017 –, Scientific advisor (credited), multimedia outreach video “TreeTender” on the relevance of the Tree of Life; in collaboration with the UF Digital Worlds institute and coordinated with the 100-year anniversary celebration of FLMNH (press release and trailer <https://www.floridamuseum.ufl.edu/science/tree-of-life-events/>; impact ~1,500 visitors over two days)
 2016, Organizing volunteer, several Tree of Life pop-up tent events (UF campus, FLMNH public museum, local brew-pub)
 2016, Table volunteer for iDigBio at BSA
 2015 –, Website with rare images, botanical illustrations, and accessible natural history information on *Heuchera*.
 2014, Oral presentation, Ohio Botany Research Symposium – “Evolutionary relationships and hybridization among species of coral bells (*Heuchera*)”
 2011 – 2015, Organizing volunteer, OSU Museum of Biological Diversity Open House (impact ~1000-3000 visitors on single-day event)
 2009, Oral presentation, Ohio Natural History Conference – “The jaw morphology of the parasitic rotifer *Proales werneckii*”

SOFTWARE REPOSITORIES:

<https://github.com/ryanafolk>
<https://github.com/juliema/aTRAM>

OUTSIDE COURSES:

2015, Phylogenomics Symposium and Software School (Ann Arbor, Michigan)
 2011, Cladistics Workshop by the Willi Hennig Society (INECOL, Xalapa, Mexico)

PROFESSIONAL SOCIETIES:

Botanical Society of America; American Society of Plant Taxonomists; Society of Systematic Biologists; Sigma Xi.