

# Nikisha R. Patel

## University of Connecticut – Storrs

Ecology and Evolutionary Biology Department

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### FIELDS OF EXPERTISE

Evolutionary Biology, Molecular Phylogenetics, Systematics, Reproductive Biology, Comparative Morphology, Taxonomy, Natural History Collections

### POSTDOCTORAL EXPERIENCE

2019 – Present: **Postdoctoral Researcher, University of Connecticut, Storrs, CT**

Faculty Sponsor: Dr. Bernard Goffinet

2018 **Postdoctoral Researcher, University of Tennessee, Knoxville, TN**

Faculty Sponsor: Dr. Jessica Budke

### EDUCATION

2018 **Ph.D. Plant Biology, University of Vermont, Burlington, VT**

“Apomixis, Hybridization, And Biodiversity In Ferns: Insights From Genera *Phegopteris* And *Polystichum*” Advisor: Dr. David Barrington

2012 **B.S. Biology, Phi Beta Kappa, University of Connecticut, Storrs, CT**

Thesis: “Cryptic dioecy and evolutionary consequences in *Solanum* species *S. vespertilio* and *S. conocarpum*” Advisor: Dr. Gregory Anderson

### PUBLICATIONS

#### In Review

Cai L, [and 12 others, including **Patel N**]. Deeply altered genome architecture in the endoparasitic flowering plant *Sapria himalayana* Griff. (Rafflesiaceae). *Current Biology*.

#### In Revision

Breinholt J, [and 23 others, including **Patel N**]. 2020. A target enrichment probe set for resolving the flagellate plant tree of life. *Applications in Plant Sciences*

#### Published

[8] Barrington DS, **Patel N**, Southgate MW. 2020. Inferring the impacts of evolutionary history and ecological constraints on spore size and shape in the ferns. *Applications in Plant Sciences* 8 (4).

## Published (continued)

- [7] Yu J, Li L, Wang S, Dong S, Chen Z, **Patel N**, Goffinet B, Liu H, Liu Y. 2020. Draft genome of the aquatic moss *Fontinalis antipyretica* (Fontinalaceae, Bryophyta). *bioRxiv*.
- [6] Southgate M, **Patel N**, Barrington, D. 2019. Ecological outcome of allopolyploidy in *Adiantum* (Pteridaceae): Niche intermediacy and expansion into novel habitats. *Rhodora*, 121(986), 108-135.
- [5] **Patel N**, Fawcett S, Sundue M, Budke J. 2019. Evolution of Perine Morphology in the Thelypteridaceae. *International Journal of Plant Science* 180 (9), 1016 – 1035.
- [4] **Patel N**, Fawcett S, Gilman A. 2019. *Phegopteris excelsior* (Thelypteridaceae): A New Species of North American Tetraploid Beech Fern. *Novon: A Journal for Botanical Nomenclature*. 27 (4), 211-218
- [3] **Patel N**, Li C, Zhang L, Barrington D. 2018. Biodiversity and apomixis: insights from the East Asian holly ferns in *Polystichum* sect. *Xiphopolystichum*. *Molecular Phylogenetics and Evolution*. 127: 345-355.
- [2] Li C, **Patel N**, Zhang L. 2016. *Polystichum clarinervium* (subg. Haplopolystichum; Dryopteridaceae), a new fern from Emei shan, China. *Phytotaxa*. 280(3): 271-277.
- [1] Anderson G, Anderson M, **Patel N**. 2015. The ecology, evolution, and biogeography of dioecy in the genus *Solanum*: With paradigms from the strong dioecy in *Solanum polygamum*, to the unsuspected and cryptic dioecy in *Solanum concocarpum*. *American Journal of Botany*. 102(3): 471-486.

## Invited

*In Prep* **Patel N**, Medina R, Johnson M, Goffinet B. Does autopolyploidy underlie cryptic speciation in moss? *Bryophyte Diversity and Evolution*. (Available for review)

## Manuscripts in Preparation

**Patel N**, Barrington D. The evolution of apomixis in montane *Polystichum* section *Duropolystichum* (Available for review)

## TEACHING EXPERIENCE

### Postdoctoral lecturer, *University of Connecticut – Storrs*

EEB 3895 – Plant Genome Evolution, Undergraduate Seminar

Spring 2020

Designed and taught an original course as instructor of record.

Course material focused on the methods and concepts critical to the study of plant genomes. Students engaged with primary literature and developed familiarity with complex genomic and genetic processes.

## TEACHING EXPERIENCE (continued)

### Postdoctoral lecturer, *University of Tennessee – Knoxville*

EEB 607 – Biodiversity Collections, Graduate Seminar Fall 2018

Designed and taught an original course as instructor of record.  
Course curriculum focused on natural history collections  
best practices, research uses for collections, and advocacy  
for natural history collections as valuable museum specimens.

### Guest Instruction

*University of Vermont, Burlington*

Undergraduate Course in Genetics – Topic: Plants and Mendelian Genetics 2016

### Teaching Assistantship:

*University of Vermont, Plant Biology*

#### Introductory

Genetics Fall 2013, 2014, 2015, 2016

#### Advanced

Ecology and Evolution Spring 2013, 2014

#### Non-Majors

Plant Biology Spring 2015, 2016

## TRAINING IN EDUCATION

### Teaching in Higher Education Workshop Series

Spring 2017

*University of Vermont - Center for Teaching and Learning*

## UNDERGRADUATE STUDENT MENTORING

### *University of Connecticut*

Olivia Lemieux - Major: EEB Current

Project: Characterizing hybridization in *Physcomitrium pyriforme*  
Summer Undergraduate Research Fund (\$3000)

Hannah Perry - Major: Biological Science 2019-2020

Project: Developing methods for sterile culture of moss

## UNDERGRADUATE STUDENT MENTORING (continued)

### *University of Vermont*

- Amanda Hill - Major: Plant Biology 2016-2017  
Phylogenetic Reconstruction in *Polystichum*
- Morgan Southgate - Major: Plant Biology 2015-2017  
Characterizing serpentine soil ecology in the *Adiantum aleuticum* complex  
*Subsequently*: Ph.D. Student, Department of Plant Biology, University of Vermont
- Jacob Suissa - Major: Plant Biology 2014-2016  
Next-generation sequencing as a tool for reconstructing reticulate evolution  
*Subsequently*: Ph.D. Student, Arnold Arboretum, Harvard University
- Sylvia Kinosian - Major: Plant Biology 2014-2015  
Reticulate evolution among Hawaiian *Polystichum* species  
*Subsequently*: Ph.D. Student, Ecology and Evolution, Utah State University  
NSF, Graduate Research Fellowship (\$103,000)
- Melita Schmeckpeper - Major: Plant Biology 2014-2015  
Reticulate evolution and cryptic species in California *Polystichum*  
*Subsequently*: Intern at Scott Arboretum, Swarthmore College

## SYMPOSIA ORGANIZED

- 2019 Reticulate evolution and biogeography in ferns and lycophytes, Botanical Society of America (BSA)

## CONFERENCE PRESENTATIONS

- 2020 **Patel N**, Medina R, Johnson M, Goffinet, B. Autopolyploidy contributes to cryptic speciation in mosses. Botanical Society of America (BSA) Annual Meeting
- 2020 Williams L, **Patel N**, Medina R, Goffinet B, Johnson M. Methods to Delimit Speciation and Determine Population Parameters of the Moss, *Physcomitrium pyriforme* Using Target Capture Sequencing. Botanical Society of America (BSA) Annual Meeting
- 2019 Budke J, **Patel N**, Wienhold M. Exploring relationships in the moss genus *Fissidens* using molecular data generated from herbarium specimens. Botanical Society of America (BSA) Annual Meeting
- 2019 Southgate M, Barrington D, **Patel N**. Ecological outcome of allopolyploidy in *Adiantum* (Pteridaceae): niche intermediacy and expansion into novel habitats. Botanical Society of America (BSA) Annual Meeting

## CONFERENCE PRESENTATIONS (continued)

- 2019 **Patel N.** Reticulate evolutionary histories of apomictic lineages in East Asian *Polystichum*. Botanical Society of America (BSA) Annual Meeting
- 2018 Barrington D, **Patel N.** Insights into allopolyploid speciation in the tropics from Andean páramo species in the fern genus *Polystichum* (Dryopteridaceae). Botanical Society of America (BSA) Annual Meeting
- 2018 **Patel N,** Barrington D. Apomixis and hybridization in *Polystichum* section *Duropolystichum* in the Himalaya and Hengduan mountains. Botanical Society of America (BSA) Annual Meeting
- 2018 **Patel N,** Fawcett S, Sundue M, Budke, J. A phylogenetic perspective on perine morphology in the Thelypteridaceae. Botanical Society of America (BSA) Annual Meeting
- 2018 Gilman A, **Patel N.** The Nature of the North American tetraploid Beech Fern. Botanical Society of America (BSA) Annual Conference
- 2018 **Patel N.** Apomixis and Reticulate evolution in *Phegopteris*. Northeastern Natural History Conference (NENHC) Annual Meeting
- 2016 **Patel N,** Barrington D. Apomixis and Biodiversity in Chinese holly fern: *Polystichum* section *Xiphopolystichum*. Botanical Society of America (BSA) Annual Meeting
- 2015 **Patel N,** Barrington D. Apomixis and Biodiversity: insight from holly fern subgroup *Xiphopolystichum* in China. Next Generation Pteridology, Washington D.C.
- 2014 **Patel N,** Barrington D, Gilman A. Reticulate origins of undescribed apomictic *Phegopteris*. Botanical Society of America (BSA) Annual meeting

## INVITED PRESENTATIONS & PANELS

- 2018 Panel-Northeastern Natural History Conference (NENHC) Annual Meeting
- 2015 Seminar-Department of Biology, Chenshan Plant Science Center, China
- 2014 Guest Lecture– Eagle Hill Institute, Steuben, Maine

## RESEARCH GRANTS & AWARDS

- In Review National Science Foundation (NSF) Research Grant (IOS) Integrating natural history collections to explore the functional morphology and evolution of the parent-offspring conflict in mosses. Senior Personnel with PI Jessica Budke
- 2017 Hesler Visiting Scholar Fund, University of Tennessee (\$3,000)
- 2015 National Science Foundation, East Asia South Pacific Institute (\$10,000)
- 2015 American Society of Naturalists, Graduate Research Award (\$2,000)
- 2014 American Society of Plant Taxonomists, Graduate Research Award (\$1,000)
- 2011 Summer Undergraduate Research Award, Univ. of Conn. (\$3,500)
- 2011 Office of Undergraduate Research, Univ. of Conn. (\$800)
- 2010 Young Botanist Award, Botanical Society of America: Special Achievement

## RESEARCH EXPERIENCE

2019-Present: **Postdoctoral Researcher, University of Connecticut – Storrs**

Collaborative research: Diversity of the moss *Physcomitrium pyriforme*: significance of autopolyploidy within a phylogenomic and experimental framework.

-Using morphometric, phylogenomic, and cytological tools to characterize the role of polyploidy in the *Physcomitrium pyriforme* complex.

2018: **Postdoctoral Researcher, University of Tennessee – Knoxville**

Comparative physiology in moss & comparative phylogenetics in ferns

-Quantifying and comparing photosynthetic recovery following desiccation for species occupying diverse habitats

2017: **Hesler Visiting Scholar, University of Tennessee – Knoxville**

A phylogenetic perspective on spore morphology in the Thelypteridaceae

-Imaged spores using SEM to score morphological characters

-Used ancestral character reconstruction to elucidate perine evolution

2012-2017: **Graduate Researcher, University of Vermont, Burlington, VT**

Apomixis and biodiversity, exploring reticulate evolution in *Polystichum*

-Used molecular phylogenetics to understand relationships between lineages

-Generated flow cytometry and spore data to characterize ploidy and reproduction

Biogeography and apomictic evolution in *Phegopteris* (Thelypteridaceae)

-Used next-generation sequencing tools to reconstruct past hybridization events

- Generated flow cytometry and spore length data to characterize ploidy

2015: **Research Fellow, Nanjing Institute of Geology and Palaeontology, Nanjing, China**

Exploring continuous morphology in apomictic complex *Xiphopolystichum*

-Conducted extensive fieldwork across China collecting morphological variants

2012, Summer: **Research Assistant, University of Vermont, Burlington, VT**

Variation in Nitrogen uptake among invasive species in *Phalaris* (Poaceae)

2011, Spring: **Laboratory assistant, University of Connecticut, Storrs, CT**

2011, Summer: **Field Assistant, University of Connecticut, Cape Town, South Africa**

2009-2012: **Undergraduate Researcher, University of Connecticut, Storrs**

## FIELD BOTANY EXPERIENCE

### *Plant Collection Trips Organized*

- Tennessee, United States April, 2019  
Collecting *Physcomitrium pyriforme* for studies of polyploidy with J. Budke
- Multiple locations in Costa Rica December 26, 2016-Jan 1, 2017  
Collecting *Dryopteris wallichiana* for studies of apomictic evolution with D. Barrington
- Multiple locations in Sichuan, China June 8-30, 2015  
Collecting accessions of species in *Xiphopolystichum* representing the spectrum of morphological variation and reproductive strategies with L. B. Zhang
- Multiple locations in Northern Maine, USA August 1-3, 2014  
Collecting accessions of *Phegopteris* and *Adiantum* for studies of reticulate evolution
- Multiple locations in Vermont, USA June 12-16, 2014  
Collecting cryptic cytotypes of *Phegopteris* in Northern Vermont with A. V. Gilman
- Multiple locations in the Greater Cape Floristic Region, South Africa Jun1-30, 2011  
Collecting *Protea* for population genetics studies with K. Holsinger

### *Field Course Participation*

- Tropical Ferns and Lycophytes*, Organization for Tropical Studies Jan, 2015  
Field identification and evolutionary biology of ferns and lycophytes in the American tropics.
- Tropical Plant Systematics*, University of Vermont, San Jose, Costa Rica Jan 1-10, 2015, 2017  
Intensive, field introduction to identification and reproductive biology of tropical angiosperms.
- Ferns and Lycophytes of New England*, Eagle Hill Biological Station, Maine Aug, 2014  
Field identification of ferns and lycophytes of New England

## PROFESSIONAL SERVICE

**Manuscript Reviewer:** *Journal of Systematics and Evolution American Journal of Botany, Phytotaxa*

### **Academic Service:**

2020-Present Society of Herbarium Curators, Professional Development Officer  
2020-Present Univ. of Connecticut, Dept. Culture and Climate Committee, PostDoc Rep.  
2020-Present American Fern Society, Fiddlehead Forum, Production Editor  
2020 Sharpe Award Judge, Botanical Society of America  
2018 Univ. of Tennessee, Diversity Committee, PostDoc Rep.  
2017 American Fern Society, Fiddlehead Forum, content contributor.  
2015 – 2017 Univ. of Vermont Board of Budget and Finance, Graduate Student Rep.  
2015 – 2016 Univ. of Vermont, Dept. of Plant Biology Faculty Meeting, Graduate Student Rep.

**Member** Botanical Society of America, American Bryological and Lichenological Society, American Fern Society

## SCIENTIFIC CONSULTANT

**Fiddleheads – Best practices for sustainable collection and safe preparation.** Guide distributed by UVM Agricultural extension.

## SOFTWARE & COMPUTATIONAL SKILLS

R (statistics, graphics, and phylogenetic comparative tools) –Python – ASTRAL – Maxent –BEAST– Mesquite – Geneious

## PUBLIC AND COMMUNITY OUTREACH

**Fern Walk Leader, Spring Wildflower Pilgrimage** 2018, 2019

One week, annual role as fern diversity educator for participants

**Planting Science Mentor, Botanical Society of America** 2014-2015

Weekly mentorship of middle school students undertaking scientific experiments

**Instructor, Upward Bound, University of Vermont** June, 2014

Designed and taught a series of lesson plans focused on plant systematics and field botany for advanced high school students from underprivileged backgrounds.