

# Bryan Piatkowski, Ph.D.

Liane B. Russell Distinguished Staff Fellow

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## Education

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Ph.D. in Biology, Duke University (2020)

- ☒ Dissertation: “From Genes to Traits and Ecosystems: Evolutionary Ecology of *Sphagnum* (Peat Moss)”, Advisor: Jon Shaw, Ph.D.
- ☒ 2020 Harold Sanford Perry Prize for best thesis research in Plant Sciences
- ☒ Minor in Genomics

M.S. in Plant Biology, Southern Illinois University (2015)

B.S. in Biology, Roanoke College (2012)

## Professional Positions

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| ☒ Distinguished Staff Fellow, Oak Ridge National Laboratory<br>Principal Investigator (PI) in the Biosciences Division | 2021 – Present |
| ☒ Postdoctoral Associate, Duke University<br>PI: Jon Shaw in the Department of Biology                                 | 2021 – 2021    |
| ☒ Graduate Teaching Assistant, Duke University   | 2016 – 2020    |
| ☒ Graduate Fellow, Duke University   | 2015 – 2016    |
| ☒ Graduate Research Assistant, Southern Illinois University<br>PI: Karen Renzaglia in the Department of Plant Biology  | 2014 – 2015    |
| ☒ Graduate Teaching Assistant, Southern Illinois University  | 2012 – 2014    |

## Research

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As an evolutionary biologist, my research broadly aims to better understand the dynamic relationship between organisms and their environment. I integrate experimental and computational techniques to gain a predictive understanding of plant evolution in the context of environmental change. The grand vision for my research is to establish robust linkages between genes, organismal

traits, and the environment in plant lineages that are important to solving the climate crisis.

Towards this end, my current research pursues two major aims: (1) understanding how climate gradients impact the evolutionary trajectories of plant lineages and (2) elucidating the molecular genetics of plant stress resilience via secondary metabolism. In this framework, I utilize poplar trees (*Populus* spp.) and *Sphagnum* peat mosses as model systems. Poplar has been targeted by the U.S. Department of Energy as one of the leading feedstock candidates for biofuel production, while peat mosses have an extraordinary impact on global climate due to their ability to sequester vast amounts of carbon and their role as keystone species of Northern Hemisphere peatland ecosystems. These efforts will aid in the preservation of biodiversity and help us move towards a more sustainable future.

#### Active Funding:

- ☒ 2022, U.S. Department of Energy (DOE), Office of Science, Office of Biological and Environmental Research (BER)  
Co-Principal Investigator on “Plant-Microbe Interfaces”
- ☒ 2021, Oak Ridge National Laboratory, Laboratory Directed Research & Development  
Lead Principal Investigator on “Evolution of Abiotic Stress Tolerance in Plants”

#### Publications:

- ☒ Healey AL, et al. (2023). A newly discovered sex chromosome in the *Sphagnum* (peat moss) genome interacts with autosomes to drive carbon sequestration and ecosystem dynamics. *Nature Plants* DOI: [10.1038/s41477-022-01333-5](https://doi.org/10.1038/s41477-022-01333-5)
- ☒ Shaw AJ, et al. (In Press). *Sphagnum diabolicum* n. sp. and *S. magniae* n. sp.: morphological variation and taxonomy of the “*S. magellanicum* complex”. *The Bryologist*.
- ☒ Piatkowski BT, et al. (2022). Draft metagenome sequences of the *Sphagnum* (peat moss) microbiome from ambient and warmed environments across Europe. *Microbiology Resource Announcements* e00400-22 DOI: [10.1128/mra.00400-22](https://doi.org/10.1128/mra.00400-22)
- ☒ Shaw AJ, et al. (2022). Phylogenomic structure and speciation in an emerging model: the *Sphagnum magellanicum* complex (Bryophyta). *New Phytologist* 236: 1497-1511 DOI: [10.1111/nph.18429](https://doi.org/10.1111/nph.18429)
- ☒ Piatkowski BT, et al. (2021). Natural selection on a carbon cycling trait drives ecosystem engineering by *Sphagnum* (peat moss). *Proceedings of the Royal Society B: Biological Sciences* 288: 20210609 DOI: [10.1098/rspb.2021.0609](https://doi.org/10.1098/rspb.2021.0609)

- ☒ Meleshko O, et al. (2021) Extensive genome-wide phylogenetic discordance is due to incomplete lineage sorting and not ongoing introgression in a rapidly radiated bryophyte genus. *Molecular Biology and Evolution* msab063 DOI: [10.1093/molbev/msab063](https://doi.org/10.1093/molbev/msab063)
- ☒ Piatkowski BT, et al. (2020). Phylogenomics reveals convergent evolution of red-violet coloration in land plants and the origins of the anthocyanin biosynthetic pathway. *Molecular Phylogenetics and Evolution* 151: 106904 DOI: [10.1016/j.ympev.2020.106904](https://doi.org/10.1016/j.ympev.2020.106904)
- ☒ Piatkowski BT & Shaw AJ (2019). Functional trait evolution in *Sphagnum* peat mosses and its relationship to niche construction. *New Phytologist* 223: 939-949 DOI: [10.1111/nph.15825](https://doi.org/10.1111/nph.15825)
- ☒ Weston DJ, et al. (2017). The Sphagnome Project: enabling ecological and evolutionary insights through a genus-level sequencing project. *New Phytologist* 217: 16-25 DOI: [10.1111/nph.14860](https://doi.org/10.1111/nph.14860)
- ☒ Renzaglia KS, et al. (2017). Hornwort stomata: architecture and fate shared with 400-million-year-old fossil plants without leaves. *Plant Physiology* 174: 788-797 DOI: [10.1104/pp.17.00156](https://doi.org/10.1104/pp.17.00156)
- ☒ Schuette S\*, Piatkowski B\*, et al. (2015). Predicted protein-protein interactions in the moss *Physcomitrella patens*: a new bioinformatics resource. *BMC Bioinformatics* 16: 89 \*Co-first authorship DOI: [10.1186/s12859-015-0524-1](https://doi.org/10.1186/s12859-015-0524-1)
- ☒ Rosche KL, et al. (2015). Infection with *Salmonella enterica* Serovar *Typhimurium* leads to increased proportions of F4/80+ red pulp macrophages and decreased proportions of B and T lymphocytes in the spleen. *PLoS One* 10: e0130092 DOI: [10.1371/journal.pone.0130092](https://doi.org/10.1371/journal.pone.0130092)
- ☒ Poli DB, et al. (2014). Polar auxin transport: understanding the effects of temperature and precipitation on polar auxin transport in *Polytrichum ohioense* could develop a moss into a climate change bioindicator. *International Journal of Thermal & Environmental Engineering* 7: 125-131 DOI: [10.5383/ijtee.07.02.009](https://doi.org/10.5383/ijtee.07.02.009)
- ☒ Poli DB, et al. (2012). Bringing evolution to a technological generation: a case study with SPORE. *American Biology Teacher* 74: 100-103 DOI: [10.1525/abt.2012.74.2.7](https://doi.org/10.1525/abt.2012.74.2.7)
- ☒ Vogel SI, et al. (2011). Effects of fire on *Lycopodium digitatum* strobili. *Jeffersoniana* 27: 1-9 ISSN: [2163-8020](https://doi.org/10.1111/j.1522-1833.2011.00020.x)

**Manuscripts in progress:**

- ☒ Fauskee B, et al. (2022). Ancient introgression in mouse lemurs (*Microcebus*:Cheirogaleidae) explains 20 years of phylogenetic uncertainty. Manuscript submitted to *Bulletin of the Society of Systematic Biologists*.
- ☒ Pardo-De la Hoz CJ, et al. (2022). Ancient radiation explains most conflicts among gene trees and well-supported phylogenomic trees of Nostocalean cyanobacteria. Revisions submitted to *Systematic Biology*.
- ☒ Piatkowski BT, et al. (2022). Divergent selection fuels genomic divergence between incipient species in the *Sphagnum magellanicum* complex. Manuscript submitted to *Annals of Botany*.

**Conference Presentations and Workshops:**

- ☒ Piatkowski BT, et al. (2022). Local adaptation fuels genomic divergence between incipient species in the *Sphagnum magellanicum* complex. Botany 2022 (Botanical Society of America). Oral presentation.
- ☒ Piatkowski B, et al. (2022). Plant-Microbe Interfaces: Quantification of *Populus* transcriptomic response to colonization by select bacterial symbionts. U.S. Department of Energy Office of Science, Genomic Science Program Annual PI Meeting. Poster presentation.
- ☒ Piatkowski BT (2021). From genes to traits and ecosystems: reconstructing the evolution of extended phenotypes in *Sphagnum* (peat moss). BL2021: Bryophytes, Lichens, and Northern Ecosystems in a Changing World (Joint conference for the International Association of Bryologists, American Bryological and Lichenological Society, Canadian Botanical Association, and Société Québécoise de Bryologie). Invited plenary presentation.
- ☒ Piatkowski BT, et al. (2021). Natural selection on a carbon cycling trait drives ecosystem engineering by *Sphagnum* peat mosses. ESA 2021: Vital Connections in Ecology (Ecological Society of America). Oral presentation.
- ☒ Piatkowski BT, et al. (2020). Carbon sequestration and niche differentiation track phylogeny in *Sphagnum* (peat moss). Botany 2020 (Botanical Society of America). Oral presentation. A.J. Sharp Award Winner for Best Student Paper Presentation
- ☒ NIMBios Workshop (2019). The search for selection. The National Institute for Mathematical and Biological Synthesis. Knoxville, TN. Participant.

- ☒ **Piatkowski BT, et al. (2018).** Do bryophytes produce anthocyanins? A study in scarlet. iMOSS 2018 (International Molecular Moss Science Society). St. Petersburg, FL. Oral presentation.  
**Awarded Best Ph.D. Student Presentation**
  
- ☒ **Piatkowski BT & Shaw AJ (2018).** Mode and tempo of functional trait evolution in *Sphagnum* peat mosses. ABLs 2018 (American Bryological and Lichenological Society). Rocky Mountain Biological Station, CO. Oral presentation.
  
- ☒ **Piatkowski BT, et al. (2014).** Predicted protein-protein interactions in the moss *Physcomitrella patens*: a new bioinformatics resource. Southern Illinois University Graduate Research Symposium. Carbondale, IL. Poster presentation.
  
- ☒ **Piatkowski BT, et al. (2013).** Apical cell development in the rhizomatous and leafy axes of the enigmatic moss *Takakia*. Botany 2013 (Botanical Society of America). New Orleans, LA. Oral presentation.
  
- ☒ **Piatkowski BT, et al. (2012).** Evolution of polar auxin transport in bryophyte gametophytes. MOSS 2012 and the 3<sup>rd</sup> International Symposium on Molecular Systematics of Bryophytes. New York Botanical Garden, NY. Poster presentation.
  
- ☒ **Piatkowski BT, et al. (2012).** Evolution of polar auxin transport in bryophyte gametophytes.  
Botany 2012 – The Next Generation (Botanical Society of America). Columbus, OH. Oral presentation.
  
- ☒ **Piatkowski BT, et al. (2011).** Studying the evolution of uptake and efflux of auxin in land plant gametophytes. MARCUS (Mid-Atlantic Regional Conference for Undergraduate Scholars). Sweetbriar College, VA. Oral presentation.
  
- ☒ **Piatkowski BT, et al. (2011).** Studying the evolution of uptake and efflux of auxin in land plant gametophytes. ABLs 2011 (American Bryological and Lichenological Society). Roan Mountain, TN. Oral presentation.
  
- ☒ **Piatkowski BT, et al. (2010).** Evolution of polar auxin transport in gametophytes. MARCUS (Mid-Atlantic Regional Conference for Undergraduate Scholars). Sweetbriar College, VA. Oral presentation.
  
- ☒ **Piatkowski BT, et al. (2009).** Studying the evolution of uptake and efflux of auxin in land plant gametophytes. MARCUS (Mid-Atlantic Regional Conference for Undergraduate Scholars). Sweetbriar College, VA. Oral presentation.

**Past Grants and Fellowships:**

- ☒ 2020, Duke Graduate School – Summer Research Fellowship
- ☒ 2019, Duke Biology Department – Biology Fellowship
- ☒ 2019, The National Institute for Mathematical and Biological Synthesis – Travel Grant
- ☒ 2018, International Molecular Moss Science Society Meeting - Travel Grant
- ☒ 2018, North Carolina Native Plant Society – Tom & Bruce Shinn Grant
- ☒ 2015 – 2018, Duke Graduate School – Summer Research Fellowship
- ☒ 2015, Duke Biology Department – First-Year Research Fellowship

**Professional Societies:**

- ☒ American Bryological and Lichenological Society (ABLS), American Society for Microbiology (AMS), Botanical Society of America (BSA), International Molecular Moss Science Society (iMOSS), Sigma Xi Scientific Research Society, Society for the Study of Evolution (SSE)

**Peer Review Activity:**

- ☒ *Molecular Biology and Evolution, New Phytologist, Plant and Soil, PLoS ONE, Journal of Microbiology and Biology Education*

**Teaching**

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My teaching experience is at undergraduate and graduate levels. While most of my experience comes from serving as an instructor for laboratory sections of biology courses, I have also served as a guest lecturer and developed assessment material. Towards the end of my graduate work, I received the annual graduate teaching assistant award for outstanding teaching from the Department of Biology at Duke University (Spring 2020). More recently, I have been engaging with programs such as Learning is ForEver (LIFE) that is geared towards continuing education for older individuals.

**Duke University**

- ☒ Genomics of Symbiosis (BIO148FS), Molecular Biology (BIO201), Molecular Biology, Genetics, and Evolution (BIO203), Organismal Evolution (BIO207), Duke in Alaska (BIO287A), Systematic Biology (BIO556L)

**Southern Illinois University**

- ☒ Introduction to Biology (PLB115), Plants and Society (PLB117), General Plant Biology (PLB200), Morphology of Vascular Plants (PLB415)

## Administration

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I have served on a number of professional committees, designed workshops relevant to my field of study, and organized symposia at international conferences. I have had the opportunity to lead several of these committees and served as President of my graduate student organization at Southern Illinois University.

### Organizational Involvement and Service:

- 2021            BL2021: Bryophytes, Lichens, and Northern Ecosystems in a Changing World. (Joint conference for the International Association of Bryologists, American Bryological and Lichenological Society, Canadian Botanical Association, and Société Québécoise de Bryologie). Organized symposium on “The Biology of *Sphagnum*”
- 2019 – 2020    Department of Biology Computing Committee, Duke University  
                   ☒ Graduate committee member
- 2019 – 2020    Panel on Scientific Integrity and Research Excellence, Duke University  
                   ☒ Graduate trainee and discussion panel member  
                   Department of Biology Computing Committee, Duke University  
                   ☒ Graduate committee member  
                   Phylogenomics Workshop Series, Duke University  
                   ☒ Co-founder, lecturer, and member of organization committee  
                   PhyloPhiles Journal Club for Systematics and Phylogenetics, Duke University  
                   ☒ Led organization committee  
                   Organisms and Evolution Seminar Series, Duke University  
                   ☒ Member of organization committee
- 2018 – 2019    Organisms and Evolution Seminar Series, Duke University  
                   ☒ Led organization committee
- 2016 – 2017    Systematics Discussion Group Seminar Series, Duke University  
                   ☒ Member of organization committee
- 2012 – 2013    Plant Biology Graduate Student Organization, Southern Illinois University  
                   ☒ Organization President