Matthew G. Johnson

June 2020

CONTACT INFORMATION Biological Sciences 2901 Main Street Lubbock, TX 79409 806-834-5750 (office) Texas Tech University matt.johnson@ttu.edu website: mossmatters.com

EDUCATION

Ph.D. Duke University, Durham, NC

May, 2013

Dissertation: "Evolution of Mating Systems in Sphagnum peatmosses"

B.S. with distinction, Duke University, Durham, NC

May 2006

Honors Thesis: "Genetic relationships within *Sphagnum cribrosum* Lind. "wave form" and "normal form" in southeastern North Carolina using three anonymous nuclear genes."

Professional Appointments **Assistant Professor**

September 2017 to present

Biological Sciences
Texas Tech University

Director E.L. Reed Herbarium (TTC)

September 2017 to present

Postdoctoral Research Associate

June 2013 to August 2017

Plant Science and Conservation Research Center

Chicago Botanic Garden

Supervisor: Norman Wickett, Ph.D

PUBLICATIONS

Journal Articles (30 total, 10 first-author, 1 last-author) Google Scholar Profile

- Ribeiro, C. L., Conde, D., Balmant, K. M., Dervinis, C., Johnson, M. G., McGrath, A. P., Szewczyk, P., Unda, F., Finegan, C. A., Schmidt, H. W., Miles, B., Drost, D. R., Novaes, E., Gonzalez-Benecke, C. A., Peter, G. F., Burleigh, J. G., Martin, T. A., Mansfield, S. D., Chang, G., Wickett, N. J. Kirst, M. (2020). The uncharacterized gene EVE contributes to vessel element dimensions in Populus. Proceedings of the National Academy of Sciences of the United States of America, 117(9), 5059–5066. doi:10.1073/pnas.1912434117
- H. Hale, E.M. Gardner, J. Viruel, L. Pokorny, and M.G. Johnson. 2020. Strategies for reducing per-sample costs in target capture sequencing for phylogenomics and population genomics in plants. Invited Special Issue: Low-cost methods in plant sciences Applications in Plant Sciences e11337. doi:10.1002/aps3.11337.
- 3. A. Ghosh, M.G. Johnson, A.B. Osmanski, S. Louha, N.J. Bayona-Vasquez, T.C. Glenn, J. Gonorga, R.E. Green, S. Isberg, R.D. Stevens, and D.A. Ray. 2020. A high-quality reference genome assembly of the saltwater crocodile, *Crocodylus porosus*, reveals patterns of selection in Crocodylidae. *Genome Biology and Evolution* 12(1), 3635–3646. doi:10.1093/gbe/evz269.
- S. Dodsworth[†], L. Pokorny[†], M.G. Johnson[†], J.T. Kim, O. Maurin, N.J. Wickett,
 F. Forrest, and W.J. Baker. 2019. Hyb-Seq for Flowering Plant Systematics.
 Trends in Plant Science doi:10.1016/j.tplants.2019.07.011

- 5. R. Medina, M.G. Johnson, Y. Liu, N. Wickett, A.J. Shaw, and B. Goffinet. Phylogenomic delineation of Physcomitrium (Bryophyta: Funariaceae) based on targeted sequencing of nuclear exons and their flanking regions rejects the retention of Physcomitrella, Physcomitridium and Aphanorrhegma. J. Systematics and Evolution 57(4): 404-417. doi:10.1111/jse.12516
- 6. Y. Liu[†], M.G. Johnson[†], C.J. Cox, R. Medina, N. Devos, A. Vanderpoorten, L. Hedenas, N. Bell, J.R. Shevock, B. Aguero, D. Quandt, N.J. Wickett, A.J. Shaw, and B. Goffinet. 2019. Resolution of the ordinal phylogeny of mosses using targeted exons from organellar and nuclear genomes. *Nature Communications* 10, Article number: 1485. doi:10.1038/s41467-019-09454-w
- 7. M.G. Johnson[†], L. Pokorny[†], S. Dodsworth[†], L.R. Botigue, R.S. Cowan, A. Devault, W.L. Eiserhardt, N. Epitawalage, F. Forest, J.T. Kim, J.H. Leebens-Mack, I.J. Leitch, O. Maurin, D.E. Soltis, P.S. Soltis, G.K. Wong, W.J. Baker, and N.J. Wickett. A Universal Probe Set for Targeted Sequencing of 353 Nuclear Genes from Any Flowering Plant Designed Using k-medoids Clustering. Systematic Biology 68(5): 594-606. doi:10.1093/sysbio/syy086
- 8. T. Villaverde, L. Pokorny, S. Olson, M. Rincon, M.G. Johnson, E.G. Gardner, N.J. Wickett, J. Molero, R. Riina, and I. Sanmartin. 2018. Bridging the micromacro evolutionary gap: target sequencing with chloroplast skimming resolves phylogenetic relationships within the Rand Flora *Euphorbia balsamifera*. New Phytologist 220:636-650. doi:10.111/nph.15312
- K. LaRiccia, M.G. Johnson, E.G. Gardner, D. Ragone, N. Zyrega, and N.J. Wickett. 2018. A transcriptome screen for positive selection in domesticated breadfruit and its wild relatives (*Artocarpus* spp.). *American Journal of Botany* 105(5): 915-926. doi:10.1002/ajb2.1095
- 10. P.G Wolf, T.A. Robison, M.G. Johnson, M.A. Sundue, W.L. Testo, and C.J Rothfels. 2018. Target Sequence Capture of Nuclear-Encoded Genes for Phylogenetic Analysis in Ferns *Applications in Plant Science* e01148. doi:10.1002/aps3.1148
- 11. H.R. Kates[†], **M.G. Johnson**[†], E.G. Gardner, N. Zyrega, and N.J. Wickett. 2018. Allele phasing has minimal impact on phylogenetic reconstruction from targeted nuclear gene sequences in a case study of *Artocarpus* (Moraceae) *American Journal of Botany* 105(3):404-416 *Invited Special Issue: Using and Navigating the Plant Tree of Life* doi:10.1002/ajb2.1068
- M.R. McKain[†], M.G. Johnson[†], S. Uribe-Convers[†], D. Eaton[†], and Y. Yang. 2018[†]. Practical considerations for plant phylogenomics. Applications in Plant Sciences 6(3):e01038. Invited Special Issue: Methods for Exploring the Plant Tree of Life doi:10.1002/aps3.1038
- R. Medina. M.G. Johnson, Y. Liu, N. Wilding, T.A. Hedderson, N.J. Wickett, and B. Goffinet. 2018. Evolutionary Dynamism in Bryophytes: Phylogenomic Inferences Confirm Rapid Radiation in the Moss Family Funariaceae. *Molecular Phylogenetics and Evolution* 120:240-247. doi:10.1016/j.ympev.2017.12.002.
- 14. D.J. Weston, M.R. Turetsky, M.G. Johnson, G. Granath, Z. Lindo, L.R. Belyea, S.K. Rice, D.T. Hanson, K.A.M. Engelhardt, J. Schmutz, E. Dorrepaal, E.S. Euskirchen, H.K. Stenoien, P. Szovenyi, M. Jackson B.T. Piatkowski, W. Muchero, R.J. Norby, J.E. Kostka, J.B. Glass, H. Rydin, J. Limpens, E. Tuittila, K.K. Ulrich, A. Carrell, B.W. Benscoter, J. Chen, T.A. Oke, M.B. Nilsson, P. Ranjan, D. Jacobson, E.A. Lileskov, R.S. Clymo, and A.J. Shaw. 2018. The Sphagnome Project: Enabling Ecological and Evolutionary Insights through a Genus-Level Sequencing Project. New Phytologist 217 (1):16-25.

- M.G. Johnson, E.M. Gardner, Y. Liu, R. Medina, B. Goffinet, A.J.Shaw, N.J.C. Zerega, and N.J. Wickett. 2016. HybPiper: Extracting coding sequence and introns for phylogenetics from high-throughput sequencing reads using target enrichment. Applications in Plant Sciences. 4(7):1600016 doi:10.3732/apps.1600016.
- E.M. Gardner, M.G. Johnson, D. Ragone, N.J. Wickett, and N.J.C. Zerega. 2016. Low-coverage, whole-genome sequencing of Artocarpus camansi (Moraceae) for phylogenetic marker development and gene discovery. Applications in Plant Sciences 4(7):1600017. doi:10.3732/apps.1600017.
- N. Brandley, M.G. Johnson, and S. Johnsen. 2016. Aposematic signals in North American black widows are more conspicuous to predators than to prey. Behavioral Ecology. 27(4):1104-1112. doi:10.1093/beheco/arw014
- 18. M.G. Johnson and A.J. Shaw. 2016. The effects of quantitative fecundity in the haploid stage on reproductive success and diploid fitness in the aquatic peat moss *Sphagnum macrophyllum*. *Heredity*. 116:523-530. doi:10.1038/hdy.2016.13.
- M.G. Johnson, C. Malley, A.J. Shaw, B. Goffinet, and N.J. Wickett. 2016. A
 phylotranscriptomic analysis of gene family expansion and evolution in the largest
 order of pleurocarpous mosses (Hypnales, Bryophyta). *Molecular Phylogenetics*and Evolution. 98:29-40. doi:10.1016/j.ympev.2016.01.008
- N. Devos, P. Szovenyi, D. Weston, C. Rothfels, M.G. Johnson. and A.J. Shaw. 2016. Analyses of transcriptome sequences reveal multiple ancient large-scale duplication events in the ancestor of Sphagnopsida (Bryophyta). New Phytologist 211(1):300-318. doi:10.1111/nph.13887.
- M.G. Johnson, K. Lang, P. Manos, G.H. Golet, and K.A. Schierenbeck. 2016.
 Evidence for genetic pollution of a California native tree, *Platanus racemosa*, via recent, ongoing introgressive hybridization with an introduced ornamental species." *Conservation Genetics*. 17(3):593-602. doi:10.1007/s10592-015-0808-z.
- 22. M.G. Johnson and A.J. Shaw. 2015. Genetic diversity, sexual condition, and microhabitat preference determine mating patterns in *Sphagnum* (Sphagnaceae) peat-mosses. *Biological Journal of the Linnean Society*. 115(1):96-113. doi:10.1111/bij.12497
- M.G. Johnson, G. Granath, T. Tahvanainen, R. Pouliot, H. Stenoien, L. Rochefort, H. Rydin, and A.J. Shaw. 2015. Evolution of niche preference in *Sphagnum* peat mosses" *Evolution*. 69(1) 90-103. doi:10.1111/evo.12547
- 24. E. Mikulaskova, M. Hajek, A. Veleba, **M.G. Johnson**, T. Tomas, and A.J. Shaw. 2015. Local adaptations in bryophytes revisited: the genetic structure of the calcium-tolerant peatmoss *Sphagnum warnstorfii* along geographic and pH gradients. *Ecology and Evolution*. 5(1) 229-242. doi:10.1002/ece3.1351
- A.J. Shaw, B. Shaw, M.G. Johnson, N. Devos, H. Stenoien, K.I. Flatberg, and B.E. Carter. 2015. Phylogenetic structure and biogeography of the Pacific Rim clade of Sphagnum subgen. Subsecunda: haploid and allopolyploid taxa. Biological Journal of the Linnean Society. 116(2): 295-311. doi:10.1111/bij.12586
- 26. A.J. Shaw, B. Shaw, M.G. Johnson, M. Higuchi, T. Arikawa, Y. Hirayama, and N. Devos. 2013. Origins, genetic structure, and systematics of the narrow endemic peatmosses (*Sphagnum*): S. triseriporum and S. calymmatophyllum (Sphagnaceae). American Journal of Botany. 100(6) 1202-1220. doi:10.3732/ajb.1200630
- 27. M.G. Johnson, B. Shaw, P. Zhou, and A.J. Shaw. 2012. Genetic analysis of the peatmoss *Sphagnum cribrosum* indicates indepent origins of an extreme infraspecific morphology shift. *Biological Journal of the Linnean Society*. 106(1):137-153. doi:10.1111/j.1095-8312.2012.01842.x

- 28. A.J. Shaw, K.I. Flatberg, P. Szovenyi, M. Ricca, **M.G. Johnson**, H. Stenoein, and B. Shaw. 2012. Systematics of the *Sphagnum fimbriatum* complex: phylogenetic relationships, morphological variation, and allopolyploidy. *Systematic Botany*. 37:36-50. doi:10.1600/036364412X616585
- M. Ricca, P. Szovenyi, E. Temsch, M.G. Johnson, and A.J. Shaw. 2011. Interploidal hybridization and mating patterns in *Sphagnum subsecundum* complex. *Molecular Ecology*. 20(15): 3202-3218. doi:10.1111/j.1365-294X.2011.05170.x
- 30. M. Ramaliya*, **M.G. Johnson**, J. Heinrichs, J. Hentschel, M. von Konrat, P. Davison, B. Shaw, and A.J. Shaw. 2010. Morphologically cryptic biological species within the liverwort *Frullania asagrayana*. *American Journal of Botany*. 97:1707-1718. doi:10.3732/ajb.1000171

(†Authors Contributed Equally; *Undergraduate Student)

IN REVIEW AND REVISION

- L.L. Bechen, M.G. Johnson, G. Broadhead, R. A. Levin, R.P. Overson, T. Jogesh, J.B. Fant, R.A. Raguso, K.A. Skogen, and N.J. Wickett. Differential gene expression associated with a floral scent polymorphism in the evening primrose Oenothera harringtonii (Onagraceae) BMC Genomics (in revision)
- 2. E.M. Gardner, M.G. Johnson[†], J.T. Pereira, A.S.A. Puad, D. Arifiani, S. Sahromi, N.J. Wickett, and N.J.C. Zerega. Paralogs and off-target sequences improve phylogenetic resolution in a densely-sampled study of the breadfruit genus (*Artocarpus*, Moraceae). *Systematic Biology (in review)*(†Authors Contributed Equally)

EXTERNAL RESEARCH GRANTS

Principal Investigator: Collaborative Research: Diversity of *Physcomitrium pyriforme* in North America and Europe: significance of autopolyploidy within a phylogenomic and experimental framework. *National Science Foundation Division of Environmental Biology*. 2018-2021. Awarded Amount: \$417,685. DEB-1753800

Subaward: Progress toward solving the silvery-thread moss issue in cool-season putting greens. *United States Golf Association*. 2019-2021. Total Awarded Amount: \$119,991. Sub-award: \$12,000. Lead Principal Investigator: Lloyd Stark, University of Nevada Las Vegas. Collaborator: Zane Raudenbush, Ohio State University.

Subaward: Digitization TCN: Collaborative: American Crossroads: Digitizing the Vascular Flora of the South-Central United States. *National Science Foundation*. 2019-2021. Total Awarded Amount: \$1,497,043. Sub-award: \$29,775. Lead Principal Investigator: Peter Fritsch, Botanical Research Institute of Texas.

AWARDS AND FELLOWSHIPS

Harold Sanford Perry Prize (\$5,500)

May 2013

- Annual departmental cash award for the best dissertation in Plant Sciences.
- Students are nominated and selected by Duke Biology faculty.

Duke Biology Department Grant-in-Aid of Research (\$500)

E. Bayard Halsted Scholarship (\$19,836)

Sigma Xi Grant-in-Aid of Research (\$1,000)

June 2012

August 2010

December 2009

Presentations Invited Seminars

On the potential of Angiosperms353 for Population Genomics Botanical Society of America July 2020 Invited Symposium Speaker: Angiosperms353: A new essential tool for plant systematics Making sense of plant biodiversity using targeted DNA sequencing

Angelo State University Tri-Beta

October 2020

 $\begin{array}{ll} \hbox{Intergeneric allopolyploidy in Funariaceae revealed through targeted sequencing} \\ Plant\ and\ Animal\ Genomes\ XXVII,\ Polyploidy\ Session & January\ 2019 \end{array}$

Embracing the Conflict: Phylogenomics and the Diversification of Mosses

American Bryological and Lichenological Society Annual Meeting August 2018

Invited Keynote Speaker

Including herbarium specimens in targeted sequencing projects: data analysis challenges and solutions.

Botanical Society of America

July 2018

Invited Colloquium Speaker: Herbaria in the Genomics Age

One Set of Markers to Rule them All: Advances in Targeted Sequencing for Phylogenetics from Populations to Phyla

Witchita State University

 $April\ 2018$

Phylogenomic insights into the radiation of bryophytes.

Utah State University

October 2017

Phylotranscriptomic analysis reveals widespread gene duplication associated with the radiation of pleurocarpous mosses

XIX International Botanical Congress, Shenzhen, China

July 2017

Building a better tree and using it wisely: Phylogenomic approaches in non-model organisms

Chicago Plant Science Symposium, Field Museum

April 201

Building a better tree and using it wisely: Phylogenomic approaches in non-model organisms

University of Connecticut Biology Forum

March 2017

Targeted Exon Sequencing in Non-Model Organisms: Best Practices for Probe Design and Data Analysis with HybPiper

PAG XXV, MycroArray Session

January 2017

Introns, Paralogs, and Ditching the Bootstrap: Targeted Sequencing with HybPiper University of Florida PopBio Seminar Series

September 2016

Phylotransciptomic insights into the radiation of mosses

2nd International Symp. on Pleurocarpous Mosses. Bonn, Germany June 2016

Evolution of niche preferences in Sphagnum

New Phytologist Sphagnum genomics meeting, invited participant

April 2016

Ecological genomics in peatlands: the rise of *Sphagnum* as a model system

University of Chicago Darwin's Weekly Seminar Series February 2016

Reconstructing the ancestral gene set of bryophytes from comparative transcriptomes PAG~XXIV,~Non-Seed~Plant~Section,~San~Diego,~CAJanuary 2016

Another abominable mystery: using phylogenomics to explore the radiation of mosses University of Wisconsin Biology Colloquium March 2015

Scaling evolution from genomes to ecosystem in peatmosses (Sphagnum)

NESCent Catalysis Meeting, invited participant

October 2014

What can phylogenetics teach us about peatland ecology?

Symposium: The evolution and ecology of aquatic bryophytes.

American Bryological and Lichenological Society Botany Conference, July 2014

Scientific Meetings

Botanical Society of America, Tuscon, AZ

July 2019

Oral Paper: Phylogenomic delineation of Physcomitrium based on targeted sequencing rejects the retention of Physcomitrella and other genera

Oral Paper: A phylogenomic approach to decode contentious relationships across all angiosperm families

Texas Plant Conservation Conference, Fort Worth, TX September 2018

Lightning Talk: The Genetic Time Machine: Investigating the Response to Climate

Change and Land Management Via a 50-Year-Old Herbarium Collection from Guadalupe

Mountains National Park

International Moss (iMOSS), Tampa, FL

June 2018

Oral Paper: Intergeneric allopolyploidy in Funariaceae revealed through targeted sequencing

Botanical Society of America, Savannah, GA

July 2016

Colloquium Presentation: A re-evaluation of ancient horizontal transfer in bryophytes using comparative transcriptome data.

Botanical Society of America, Edmonton, AB

July 2015

Oral Paper: Phylotranscriptomic insights into the radiation of pleurocarpous mosses.

Botanical Society of America, Boise, ID

July 201

Oral Paper: Constructing phylogenetic datasets with bait-capture data without a genome: strategies and challenges.

Botanical Society of America, New Orleans, LA

July 2013

Oral Paper: The relationship between mating patterns, sexual condition, and microhabitat preference in Sphagnum

American Society of Human Genetics, San Francisco, CA November 2012 Poster: Comparison of phylogenetic and haplotype methods for the study of genotypephenotype association in genome-wide studies.

Botanical Society of America, Columbus, OH

July 2012

Poster: Evolution of microhabitat preference in Sphagnum

Evolution Meeting, Norman, OK

June 2011

Oral Paper: Fitness and fecundity variance in a natural Sphagnum population: potential for sexual selection?

Co-authored Presentations by Mentees

Botanical Society of America, Tuscon, AZ

July 2019

Poster Conservation genomics of plant populations in Guadalupe Mountains National Park using herbarium specimens.

Presented by: Madeline Slimp, Honors URS, Texas Tech University

Poster The effect of life-history strategies on stomatal characteristics using herbarium specimens from Guadalupe Mountains National Park.

Presented by: Zachary Bailey, Honors URS, Texas Tech University

Oral Paper Phylogenetic information in seed morphology and seed germination for shortgrass prairie species.

Presented by: Yanni Chen, Ph.D. Student, Texas Tech University

Oral Paper Developing a cost-effective workflow for targeted sequencing of herbarium

specimens using Angiosperms353. Presented by: Haley Hale, Technician III, Texas Tech University

TEACHING EXPERIENCE	Professor, Texas Tech University Biology of Plants (BIOL 1401) Phylogenetics (BIOL 6304) Evolution of Plants (BOT 3404) Bioinformatics User Group Series (BIOL 4101-003) Seminar course, co-instructor with Dr. Amanda Brown Typical Enrollment: 10-15		
	Co-instructor, Northwestern University Field and Lab Methods in Plant Biology and Conservation (PSC 450) Phylogenetics and Genomics Section Nyree Zerega, Course Coordinator		
	Teaching Assistant , Duke University Biology D BIO 212L Microbiology BIO 26L Organismal Diversity	Spring 2009, Fall 2012, Spring 2013 Summer 2010	
MENTORING AND	Graduate Major Advisor		
Advising	 Yanni Chen, Texas Tech University Aman Pruthi, Texas Tech University Co-advisor: Zhixin Xie 	Ph.D. Student 2018- M.S. Student 2019-	
	- Lindsay Williams, Texas Tech University Graduate Research Advisor	Ph.D. Student 2020-	
	– Kira Buckowing, Texas Tech University	M.S. Student 2019-	
	Department: Biotechnology and Bioinforms - Katie Holt, Texas Tech University Department: Museum Science	M.S. 2019	
	Thesis Committees: Active - Kelly McMillen, Texas Tech University	M.S. Student	
	Advisor: Natasja VanGestel – Morgan Long, Texas Tech University	M.S. Student	
	Advisor: Dylan Schwilk - Austin Osmanski, Texas Tech University	Ph.D. Student	
	Advisor: David Ray - Jennifer Korstian, Texas Tech University	Ph.D. Candidate	
	Advisor: David Ray - Nan Hu, Texas Tech University Advisor: Matt Olson	Ph.D. Student	
	 Advisor: Matt Olson Shiva Aghdam, Texas Tech University Advisor: Amanda Brown 	Ph.D. Student	
	- Minghao Guo, Texas Tech University Advisor: Matt Olson	Ph.D. Student	
	- Colby Witherup, Northwestern University Advisor: Norman Wickett	Ph.D. Candidate	
	Thesis Committees: Past - Claire Malley, Northwestern University	M.S. 2015	
	Advisor: Norman Wickett - Shariful Islam, Texas Tech University	Ph.D. Student 2018-2019	
	Advisor: Zhixin Xie – Hendra Siaholo, Texas Tech University Advisor: Amanda Brown	Ph.D. Student 2019	

Undergraduate Researchers

- Cassidy Coker, Honors College (URS) Herbarium	2019-present
– Madeline Slimp, Honors College (URS) Herbarium	2018- present
- Kristina Robinson <i>Herbarium</i>	2018-2019
– Lauren Winfrey, Independent Research Herbarium	2018-2019
- Zachary Bailey, Honors College (URS) Herbarium	2017-2019
Past Students Mentored	
– Elliot Gardner, Northwestern University	Ph.D. 2017
– Marissa Ashner, Illinois Institute of Technology	REU 2016
– Lindsey Bechen, Amherst College	REU 2015
- Kristen Laricchia, Northwestern University	M.S. 2014

Professional Affiliations

Departmental

- Director, E.L. Reed Herbarium	2017-present
- Chair, Seminar Committee	2019-present
- Member, Space Committee	2018-present
- Elected Member, Initiatives Committee	2020-present
- Search Committee Member, Quantitative Biologist	2018

Professional

- Applications in Plant Sciences, Guest Special Issue Editor: Angiosperms353 2020
 Technology Committee Member, Botanical Society of America 2019-present
- Reviewer: Analytical Biochemistry, American Journal of Botany, Applications in Plant Sciences, Botanical Journal of the Linnean Society, Ecology and Evolution, Frontiers in Plant Science, Molecular Biology and Evolution, Molecular Phylogenetics and Evolution, New Phytologist, Perspectives in Plant Ecology Evolution and Systematics, Restoration Ecology, Reviews in Plant Science, PeerJ, Bioinformatics

Other Service

Freely available bioinformatics pipelines and programming tutorials http://github.com/mossmatters