

Sarah B. Carey

Curriculum vitae

Postdoctoral Fellow
HudsonAlpha Institute for Biotechnology
scarey@hudsonalpha.org

Education and Training

- 2022-present **United States Department of Agriculture National Institute of Food and Agriculture (USDA NIFA) Postdoctoral Fellow**
“Developing genomic resources to sustainably accelerate hop breeding”
HudsonAlpha Institute for Biotechnology, Huntsville, AL
Adviser: Alex Harkess
- 2020-2022 **Postdoctoral Associate, Auburn University, Auburn, AL**
Adviser: Alex Harkess
- 2014-2020 **Ph.D., Botany, University of Florida, Gainesville, FL**
“Sex-biased evolutionary processes in mosses”
Adviser: Stuart McDaniel
- 2012-2014 **B.S., Biology, University of Florida, Gainesville, FL**
Summa cum laude
“A method for eliminating bacterial contamination from in vitro mosses”
Adviser: Stuart McDaniel
- 2009-2012 **A.A., Saint Johns River State College, St. Augustine, FL**
Summa cum laude

Positions Held

- 2020-present **Postdoctoral Fellow**, HudsonAlpha Institute for Biotechnology, Huntsville AL
- 2020-2022 **Postdoctoral Associate**, Department of Crop, Soil, and Environmental Science, Auburn University, Auburn AL
- 2014-2020 **Teaching Assistant**, Department of Biology, University of Florida, Gainesville, FL
- 2016-2019 **Research Assistant**, *Genealogy of Flagellate Plants Project*, University of Florida, Gainesville, FL
- 2013-2014 **Undergraduate Research Assistant**, Department of Biology, University of Florida, Gainesville, FL
- 2011-2012 **Chemistry Lab Assistant**, Chemistry Department, Saint Johns River State College, St. Augustine, FL

Publications

Carey, S.B., J.T. Lovell, J. Jenkins, J. Leebens-Mack, J. Schmutz, M.A. Wilson, A. Harkess. Representing sex chromosomes in genome assemblies. *Cell Genomics* (2022): 100132. doi:/10.1016/j.xgen.2022.100132

Carey, S.B.[†], L. Aközbek[†], A. Harkess. The contributions of Nettie Stevens to the field of sex chromosome biology. *Philosophical Transactions of the Royal Society B* 377, no. 1850 (2022): 20210215. doi:/10.1098/rstb.2021.0215

Khan, A., **S.B. Carey**, A.S. Gomez, H. Zhang, H. Hargarten, H. Hale, A. Harkess, L. Honaas. A phased, chromosome-scale genome of 'Honeycrisp' apple (*Malus domestica*). *Gigabyte* (2022). doi:/ 10.46471/gigabyte.69

Boquete, M.T., M.W. Schmid, N.C.A.M. Wagemaker, **S.B. Carey**, S.F. McDaniel, C.L. Richards, C. Alonso. Molecular basis of intraspecific differentiation for heavy metal tolerance in the copper moss *Scopelophila cataractae*. *Environmental and Experimental Botany* 201 (2022): 104970. doi:/10.1016/j.envexpbot.2022.104970

Carey S.B., J. Jenkins, J.T. Lovell, F. Maumus, A. Sreedasyam, A.C. Payton, S. Shu, G.P. Tiley, N. Fernandez-Pozo, K. Barry, C. Chen, M. Wang, A. Lipzen, C. Daum, C.A. Saski, J.C. McBreen*, R.E. Conrad*, L.M. Kollar, S. Olsson, S. Huttunen, J.B. Landis, J.G. Burleigh, N.J. Wickett, M.G. Johnson, S.A. Rensing, J. Grimwood, J. Schmutz, S.F. McDaniel. Gene-rich UV sex chromosomes harbor conserved regulators of sexual development. *Science Advances* 7.27 (2021) doi:/10.1126/sciadv.abh2488

Carey, S., Q. Yu, A. Harkess. The diversity of plant sex chromosomes highlighted through advances in genome sequencing. *Genes* 12.3 (2021): 381 doi:/10.3390/genes12030381

Carey S.B., L.M. Kollar, S.F. McDaniel. Does degeneration or genetic conflict shape gene content on UV sex chromosomes? *Bryophyte Diversity and Evolution* 43.1 (2021): 133-149 doi:/10.11646/bde.43.1.11

Shortlidge E.E., **S.B. Carey**, A.C. Payton, S.F. McDaniel, T.N. Rosenstiel, S.M Eppley. Microarthropod contributions to fitness variation in the common moss *Ceratodon purpureus*. *Proceedings of the Royal Society B* (2021): 20210119 doi:/10.1098/rspb.2021.0119

Breinholt, J.W., **S.B. Carey**, G.P. Tiley, E.C. Davis, L. Endara, ... J.G. Burleigh. A target enrichment probe set for resolving the flagellate plant tree of life. *Applications in plant sciences*. 9(1), e11406 (2021) doi/10.1002/aps3.11406

Burtscher, W.P.*[†], M.A List*[†], A.C. Payton, S.F. McDaniel, **S.B. Carey**. Area from image analyses accurately estimates dry-weight biomass of juvenile moss tissue. *Applications in Plant Sciences* 9(4), e11418 (2021) doi:/10.1002/aps3.11418

Valle, N., P. Antonenko, L. Endara, E.C. Davis, G. Somarriba, E. Sessa, F. Luo, **S. Carey**, S. Dogan, J.G. Burleigh, S.F. McDaniel. Community science, storytelling, or inquiry-based learning? Evaluating three technology-enhanced pedagogical approaches in an online botany course. *The American Biology Teacher* 83, no. 8 (2021): 513-520. doi:/10.1525/abt.2021.83.8.513

Luo, F., N. Valle, E. Sessa, G. Burleigh, L. Endara, S. McDaniel, **S. Carey**, and E. C. Davis. Collaborative Design Reasoning in a Large Interdisciplinary Learning Tool Design Project. *International Journal of Designs for Learning* 11, no. 1 (2020): 85-97.

Pereira, M.R., P.E.A.S. Câmara, B.S. Amorim, S.F. McDaniel, A.C. Payton, **S.B. Carey**, A.M. Sierra, and C.E. Zartman. Advances in Calymperaceae (Dicranidae, Bryophyta): Phylogeny, divergence times and pantropical promiscuity. *The Bryologist* 122, (2), 183-196. 2019 doi:/10.1639/0007-2745-122.2.183

Lewis, L.R., E.M. Biersma, **S.B. Carey**, K. Holsinger, S.F. McDaniel, R. Rozzi, and B. Goffinet. Resolving the northern hemisphere source region for the long-distance dispersal event that gave rise to the South American endemic dung moss *Tetraplodon fuegianus*. *American Journal of Botany* 104 (11), 1651-1659. 2017 doi:/10.3732/ajb.1700144

Carey, S.B., A.C. Payton, and S.F. McDaniel. A method for eliminating bacterial contamination from in vitro moss cultures. *Applications in Plant Sciences* 3(1):1400086. 2015 doi:/10.3732/apps.1400086

Publications in Progress

Johnson, A.R., Y. Yue, **S.B. Carey**, S.J. Park, L.H. Kruse, A. Harkess, A. Bao, A. Pasha, N.J. Provart, G.D.J. Moghe, and M. Frank. Chromosome-level genome assembly of *Euphorbia peplus*, a model system for plant latex, reveals that relative lack of Ty3 transposons contributed to its small genome size. *bioRxiv* (2022) doi:/10.1101/2022.10.13.512124

Carey, S.B., J.H. Peniston, A.C. Payton, M. Kim, A. Lipzen, D. Bauer, K. Lail, C. Daum, K. Barry, J. Jenkins, J. Grimwood, J. Schmutz, S.F. McDaniel. Novel insights into joint estimations of demography, mutation rate, and selection using UV sex chromosomes. *bioRxiv* (2021) doi:/10.1101/2021.03.30.437085

*Undergraduate mentee

*Contributed equally

Grants and Funding

Grants Funded

2021	USDA NIFA Postdoctoral Fellowship (PI; \$225,000)
2021	Joint Genome Institute, New Investigator (PI; no direct)
2020	The Joint Genome Institute, Community Science Program (co-PI; no direct)
2018	Botanical Society of America Genetics Section Student Award (\$1000)
2016	Sigma Xi Grant-In-Aid of Research (\$1000)
2015	Society for the Study of Evolution Rosemary Grant Award (\$2500)
2015	microMORPH Cross-Disciplinary Training Grant (\$3254)
2015	Mildred Mason Griffith Botany Grant, UF (\$1000)

Travel funding

2018	Wellcome Genome Campus 30 Year Anniversary Award (\$300)
2017	International Botanical Congress Outstanding Student Award (\$300)
2017	Botanical Society of America IBC Travel Award (\$2400)

2016 UF Graduate Student Council Travel Grant (\$350)
 2016, 2020 UF College of Liberal Arts and Sciences Travel Award (\$475)

Honors and Awards

2022. Third place Postdoc poster presentation, UGA Plant Center Retreat
 2018 Best talk iMoss Meeting, St. Petersburg, FL
 2016 NSF GRFP Honorable Mention
 2015 Runner-up best graduate student talk, SEPEEG, Eaton, GA
 2014 Runner-up best talk, UF URAP, Gainesville, FL
 2012 Saint Johns River State College Hall of Fame
 2012 Organic Chemistry Award, Saint Johns River State College
 2012 Composition I and II Award, Saint Johns River State College
 2012 Dr. Gary B. Lott Memorial Scholarship (\$750)

Invited Talks

2022 *Exploring the multiple evolutions of sex chromosomes in plants*. Plant Reproductive Biology Symposium, Michigan State University
 2022 *The evolution of plant sex chromosomes: advances in genomic technologies and our understanding of these complex regions*. IBIS Seminar series, Université Laval
 2021 *The evolution of plant sex chromosomes: advances in genomic technologies and our understanding of these complex regions*. ISEB Seminar Series, University of Zurich
 2020 Cryptic evolutionary strata in an ancient sex chromosome system. University of Connecticut Ecology and Evolutionary Biology Plant Lunch
 2020 *Remarkable genome stability in autosomes contrasts with dynamic sex chromosomes in mosses*. Plant and Animal Genome Conference. San Diego, CA
 2020 *Implications of whole-genome duplications on sex chromosomes in mosses*. Plant and Animal Genome Conference. San Diego, CA
 2019 *Phylogenomic analyses uncover ancient but highly dynamic moss sex chromosomes*. Plant and Animal Genome Conference. San Diego, CA
 2017 *An ancient UV sex chromosome system in mosses*. International Botanical Congress. Shenzhen, China

Conference Oral Presentations

2022 *Building fully-phased sex chromosome assemblies in plants*. Southern Section ASPB Meeting. Birmingham, AL
 2021 *Comparative genome analyses to infer the diversification of sex chromosomes in the genus Asparagus*. Virtual ESEB Sex Chromosome Meeting
 2021 *Plant sex chromosome "Cytogenetics-by-Sequencing"*. Virtual Botany Conference
 2021 *Comparative genome analyses to infer the diversification of sex chromosomes in the genus Asparagus*. Virtual Plant Sex Chromosome Meeting
 2020 Cryptic evolutionary strata in an ancient sex chromosome system. Virtual Botany Conference
 2019 *An ancient, dynamic sex chromosome system in plants*. UF HiPerGator Symposium
 2019 *Genomic consequences of UV sex chromosomes*. Botany Conference. Tucson, AZ
 2019 *Genomic consequences of UV sex chromosomes*. Evolution Meeting. Providence, RI

- 2018 *Genome analysis in a polymorphic moss with large, ancient sex chromosomes.* Genome Informatics. Hinxton, UK
- 2018 *Ancient sex chromosomes in plants.* Botany Conference. Rochester, MN
- 2018 *Ancient sex chromosomes in bryophytes.* iMoss Meeting, St. Petersburg, FL
- 2017 *An ancient UV sex chromosome system in mosses.* Evolution Meeting. Portland, OR
- 2016 *Sex-biased gene expression in 6-day-old *Ceratodon purpureus*.* South Eastern Population Ecology and Evolutionary Genetics Meeting. Madison, FL
- 2016 *Using a SNP-corrected genome-guided approach to infer transcriptional dimorphism in *Ceratodon purpureus*.* Evolution Meeting. Austin, TX
- 2016 *Transcriptional dimorphism in juvenile tissue of the moss *Ceratodon purpureus*.* UF Plant Molecular and Cellular Biology Meeting. Daytona, FL
- 2015 *The genetic basis of spore production in the moss *Ceratodon purpureus*.* South Eastern Population Ecology and Evolutionary Genetics Meeting. Eaton, GA
- 2014 *A method for eliminating bacterial contamination from in vitro moss cultures.* UF URAP. Gainesville, FL

Conference Poster Presentations

- 2022 *Building fully-phased sex chromosome assemblies in plants.* UGA Plant Center Retreat
- 2022 *Building fully-phased sex chromosome assemblies in plants.* ASPB Meeting. Portland, OR
- 2022 *Building fully-phased sex chromosome assemblies in plants.* CROPS Conference. Huntsville, AL
- 2019 *Near universal sex-linked marker in mosses.* Botany Conference. Tucson, AZ
- 2019 *Transcriptional dimorphism driven by large sex chromosomes in fire moss.* Evolution Meeting. Providence, RI
- 2017 *An ancient UV sex chromosome system in mosses.* Evolution Meeting. Portland, OR
- 2014 *A method for eliminating bacterial contamination from in vitro moss cultures.* UF Undergraduate Research Symposium Poster Session
- 2013 *A method for eliminating bacterial contamination from in vitro moss cultures.* UF Chemistry Department Alumni Weekend Poster Session

Teaching Experience

Teaching Assistant, Department of Biology, University of Florida, Gainesville, FL

Spring semesters 2018-2020 **Plant Diversity Online**

- Assist with running online course

Fall semesters 2015-2019 **Introductory Botany**

- Taught labs and assisted in lecture
- Wrote three labs for doing semester-long growth experiments in mosses (1. Setting up experiments, 2. Image analyses using ImageJ, 3. Statistical analyses using R)
- Wrote a lab to learn mitosis and meiosis

Spring semesters 2015-2017 **Plant Diversity**

- Taught labs and assisted in lecture
- Edited lab manual, developed new questions

Fall 2014, Summer 2015

Principles of Biology II Lab

- Taught labs

Non-refereed Publications

F.E. Putz, E.C. Davis, and **S.B. Carey**. University of Florida Introductory Botany Laboratory Manual. 2016-2019.

G. Ionta, M. Blanco, B. Knorr, S. Allen, **S. Carey**, and S. McDaniel. University of Florida Plant Diversity Lab Manual. 2016-2018.

Guest Lectures

2022 **Examining dioecy genes across plants.** Randolph Interim Week.
HudsonAlpha
2020-present **Examining dioecy genes across plants.** Genes and Greens. HudsonAlpha
2021 **Identifying sex chromosomes in plant genome assemblies using k-mers.**
Genomics Colloquium. Auburn University
2021 **Comparative genomics and sex chromosome evolution in mosses.**
Introductory Biology. SUNY Cortland
2019 **Orthofinder.** Bioinformatic Users Group Series. Texas Tech University
2018 **Genetic Frontiers.** Introductory Botany. University of Florida

Mentoring

Summer 2021 **Laramie Aközbek.** *Assembling the genome of Morella cerifera*
• Now NSF GRFP recipient and PhD student, Auburn University

2016-2020 **Wes Burtscher.** *Sexual dimorphism in juvenile tissue across mosses*
• Now lab assistant in McDaniel lab

2018-2019 **Tikahari Khanal.** *Mapping improvement in polymorphic Ceratodon purpureus*
• REU recipient
• Now Software Engineer, Procter & Gamble

2016-2019 **Emily Lockwood.** *Species-level phylogeny of Equisetum*
• UF University Scholars Program recipient

Summer 2018 **Joan Glenny-Pescov.** *Sex-biased gene expression in Ceratodon purpureus*
• UF Summer Undergraduate Research Fellow visiting from Florida International University
• Now PhD student, University of Miami

Summer 2018 **Jordan McBreen.** *Tissue perturbations and RNA extractions for Ceratodon purpureus genome annotation*
• Now PhD student, UF

2017-2018 **Keylee Hoffman.** *Trained on molecular lab techniques*

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| 2017-2018 | Kristen Gaines. <i>Testing a near-universal sex-linked marker in mosses</i> <ul style="list-style-type: none"> • Now PhD student, UF |
| 2015-2016 | Marna List. <i>Evaluating methods for growth analyses in mosses</i> <ul style="list-style-type: none"> • UF University Scholars Program recipient • UF Medical Honors Student |
| 2014-2016 | Roth Conrad. <i>Transcriptomic analyses in <i>Ceratodon purpureus</i></i> <ul style="list-style-type: none"> • UF University Scholars Program recipient • Best undergraduate student talk, SEPEEG 2016, Madison, FL • Now PhD Candidate, Georgia Tech |

Academic Service and Outreach

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| 2022 | Alabama STEAMFest Volunteer, Huntsville, AL |
| 2022 | Trained high school teachers on genome assembly |
| 2020-present | Gave tours of HudsonAlpha's Genome Sequencing Center and Greenhouse |
| 2020 | Organized symposium at the Botany Conference |
| Summer 2019 | Co-organizer Population Biology Summer Seminar Series |
| 2016 | Invited scientist at <i>She's a Scientist!</i> , FL Museum of Natural History |
| 2015-2018 | UF Biology Department URAP Committee |
| 2015-2016 | Organizer of Art of Biology Art Exhibition, UF Dept. of Biology |
| 2015-2016 | UF Biology Department Awards Committee |
| 2014, 2019 | Poster judge, UF Biology Department URAP Symposium |
| 2014-2016 | Graduate Student Advisor, GROW Botany |
| 2013, 2014 | Undergraduate Researcher Panelist, UF FYI Biology |
| 2013-2014 | Vice-President & Founding Member, GROW Botany
(Recipients of Champions for Change Award, Campus Organization of the Year) |
| 2013-2014 | Vice-President, Botanical Society of America UF Student Chapter |

Professional Affiliations

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| 2022-present | American Society for Plant Biologists |
| 2015-present | Society for the Study of Evolution |
| 2013-present | Botanical Society of America |