

Samuel H. Church, PhD

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New Haven, Connecticut

February, 2023

1 Appointments and Education

Yale University, NSF Postdoctoral Fellow

Department of Ecology and Evolutionary Biology

Advisor: Dr. Casey Dunn

August 2021 - present

Harvard University, PhD

Department of Organismic and Evolutionary Biology

Thesis advisor: Dr. Cassandra Extavour

Graduated May, 2021

Brown University, BS in Biology with honors

Department of Ecology and Evolutionary Biology

Graduated May, 2015

2 Awards

Postdoctoral Research Fellowship in Biology, NSF

2021

Student Sustainability Grant, Office of Sustainability, Harvard University

2019

Certificate of Distinction in Teaching, Derek Bok Center, Harvard University

2016, 2018

Graduate Student Research Fellowship, NSF

2016

James Mills Peirce Fellowship for Academic Excellence, Harvard University

2015

Maria L. Caleel Memorial Award for Academic Excellence, Brown University

2015

Summer Undergraduate Research Fellowship, NSF

2014

Undergraduate Travel Award, SMBE

2014

EPSCoR Rhode Island, NSF

2013

LINK award, Brown and Marine Biological Laboratory at Woods Hole

2013

3 Publications

†corresponding author

*equal contribution

In review

1. **Church, SH[†]**, Mah, Jasmine L, Wagner, Günter, and Dunn, CW, 2022. Normalizing need not be the norm: count-based math for analyzing single-cell data. (In review at *Bioinformatics*). *bioRxiv* doi: 10.1101/2022.06.01.494334.

Published

2. **Church, SH[†]**, Munro, C, Dunn, CW, and Extavour, CG, 2021. The evolution of ovary-specific gene expression in Hawaiian *Drosophilidae*. *PLOS Genetics*, 19(1). e1010607
3. **Church, SH[†]** and Extavour, CG, 2022. Phylotranscriptomics reveals discordance in the phylogeny of Hawaiian *Drosophila* and *Scaptomyza* (Diptera: Drosophilidae). *Molecular Biology and Evolution*, 39(3). 1-18.
4. **Church, SH[†]**, Donoughe, S[†], and Extavour, CG[†], 2021. JEZB special issue on eggs: editorial. *Journal of Experimental Zoology Part B: Molecular and Developmental Evolution*, 336(8). 593-594.

5. **Church, SH[†]**, de Medeiros, BA, Donoughe, S, Reyes, NLM and Extavour, CG[†], 2021. Repeated loss of variation in insect ovary morphology highlights the role of development in life-history evolution. *Proceedings of the Royal Society B*, 288(1950). 1-9.
6. **Church, SH[†]**, and Extavour, CG[†], 2020. Null hypotheses for developmental evolution, *Development*, 147(8). 1-6.
7. **Church, SH^{*†}**, Donoughe, S*, De Medeiros, BA and Extavour, CG[†], 2019. Insect egg size and shape evolve with ecology but not developmental rate. *Nature*, 571(7763). 58-64.
8. **Church, SH^{*†}**, Donoughe, S*, De Medeiros, BA and Extavour, CG[†], 2019. A database of egg size and shape from more than 6,700 insect species. *Scientific Data*, 6(104). 1-11.
9. Sarikaya, DP[†], **Church, SH**, Lagomarsino, LP, Montgomery, S, Magnacca, KN, Price, DK, Kaneshiro, KY and Extavour, CG, 2019[†]. Reproductive capacity evolves in response to ecology through common developmental mechanisms in Hawaiian *Drosophila*. *Current Biology*, 29(11). 1877-1884.
10. Munro, C[†], Siebert, S, Zapata, F, Howison, M, Damian-Serrano, A, **Church, SH**, Goetz, FE, Pugh, PR, Haddock, SH and Dunn, CW, 2018. Improved phylogenetic resolution within Siphonophora (Cnidaria) with implications for trait evolution. *Molecular Phylogenetics and Evolution*, 127. 823-833.
11. **Church, SH[†]**, Ryan, JF and Dunn, CW, 2015. Automation and evaluation of the SOWH test with SOWHAT. *Systematic Biology*, 64(6). 1048-1058.
12. Zapata, F[†], Goetz, FE, Smith, SA, Howison, M, Siebert, S, **Church, SH**, Sanders, SM, Ames, CL, McFadden, CS, France, SC and Daly, M, 2015. Phylogenomic analyses support traditional relationships within Cnidaria. *PLoS One*, 10(10). p.e0139068.
13. **Church, SH[†]**, Siebert, S, Bhattacharyya, P and Dunn, CW, 2015. The histology of *Nanomia bijuga* (Hydrozoa: Siphonophora). *Journal of Experimental Zoology Part B: Molecular and Developmental Evolution*, 324(5), 435-449.
14. Siebert, S[†], Goetz, FE, **Church, SH**, Bhattacharyya, P, Zapata, F, Haddock, SH and Dunn, CW, 2014. Stem cells in a colonial animal with localized growth zones. *Developmental Biology*. 275. 215-224.

4 Software

countland: python and R package for using count-based algebra to analyze and visualize transcriptome data, available via pip (<https://pypi.org/project/countland>) and CRAN (<https://cran.r-project.org/web/packages/countland>)

SOWHAT: command-line tool (perl) for automating the SOWH test, a statistical test for comparing phylogenetic hypotheses <https://github.com/josephryan/sowhat>

Insect egg data visualization: interactive graph (javascript, d3) for exploring the diversity of insect egg shapes and sizes <https://shchurch.github.io/dataviz/index.html>

github: <https://github.com/shchurch>

5 Presentations

Symposium organizer

1. Church, SH and Donoughe, SD. Insect Eggs: Ecology, Morphology, and Applied Entomology. Organized at Entomology, 2017, Denver, CO

Oral presentations

1. Church, SH. Insect eggs, evo-devo, and single-cell analysis. Brown University invited seminar speaker, 2023, Providence, RI.
2. Church, SH, Munro, C, Dunn, CW, and Extavour, CG. Gene expression evolution across organs and species of Hawaiian *Drosophila*. Presented at Evolution, 2022, Cleveland, OH.
3. Church, SH, Extavour, CG. Comparing gene expression data across species using evolutionary methods. Presented at Models, Inference, and Algorithms, Broad Institute of MIT and Harvard, 2022, Cambridge, MA. Recording available at <https://youtu.be/ImZQgs2SW38>.
4. Church, SH, Donoughe, SD, De Medeiros, B, and Extavour, CG. Assembling a database of egg morphologies from 6,500+ insect species to test long-standing questions about the evolution of life history strategies. Presented at Entomology 2017, Denver, CO
5. Church, SH, Donoughe, SD, De Medeiros, B, and Extavour, CG. An Eggcellent Adventure: The eggs from (almost) every insect species you've ever heard of. Presented at Cambridge Entomological Society, 2017, Cambridge, MA
6. Church, SH, Donoughe, SD, De Medeiros, B, and Extavour, CG. The Evolution of Insect Egg Shape Across Eight Orders of Magnitude, Presented at Evolution, 2017, Portland, OR
7. Church, SH. SOWHAT? The Swofford-Olsen-Waddell-Hillis (SOWH) Test of Topologies. Presented at the 2013 CCV/Bioinformatics Workshop at Brown University, Providence, RI, with the Marine Biological Laboratory at Woods Hole.

Poster presentations

1. Church, SH and Extavour, CG. Ancestral states, null hypotheses, and phylogenetic comparative methods for developmental genetics. The Pan-American Society for Evolutionary Developmental Biology, 2019, Miami, FL.
2. Church, SH and Extavour, CG. Genetic and taxonomic concordance in a comprehensive phylogeny of Hawaiian *Drosophilidae* flies. Evolution, 2019, Providence, RI.
3. Church, SH, Donoughe, SD, De Medeiros, B, and Extavour, CG. The Evolution of Gene Expression in the Island Radiation of Hawaiian *Drosophila*. Presented at the Second Joint Congress on Evolutionary Biology, Montpellier, France.
4. Church, SH, Donoughe, SD, De Medeiros, B, and Extavour, CG. The Evolution of Insect Egg Size. Presented at The Allied Genetics Conference, Orlando, FL.
5. Church, SH, Donoughe, SD, De Medeiros, B, and Extavour, CG. The Evolution of Insect Egg Size. Presented at Evolution 2016, Austin, TX.
6. Hancock, L, Church, SH, and Edwards, E. A New Look at an Old Method for Isotopically Characterizing Low-level CAM Activity. Presented at the 34th New Phytologist Symposium on Crassulacean Acid Metabolism, Lake Tahoe, CA.
7. Church, SH. Automation and Evaluation of the SOWH test of Phylogenetic Topologies. Presented at the Society for Molecular Biology and Evolution, 2014 conference, Puerto Rico.

6 Editing and Peer Review

Guest associate editor

Journal of Experimental Zoology: Part B

2019 - 2020

Reviewer

<i>Scientific Reports</i>	2023
<i>The Canadian Entomologist</i>	2023
<i>The American Naturalist</i>	2022
<i>Systematic Biology</i>	2022
<i>Ecology</i>	2022
<i>Science Advances</i>	2022
<i>Functional Ecology</i>	2021
<i>Methods in Ecology and Evolution</i>	2021
<i>Journal of Biogeography</i>	2019
<i>PeerJ</i>	2019

7 Teaching Experience

Graduate teaching fellow, Harvard University

Biology of Insects Fall, 2018 and Fall, 2019
Instructor of record: Dr. Naomi Pierce

The Developmental Basis for Evolutionary Change Fall, 2016
Instructors of record: Dr. Mansi Srivastava, Dr. Matthew Harris, and Dr. Cliff Tabin

English teacher, Boston Cambridge English Class

Free adult education in beginner, intermediate, and conversational English 2015 - 2019

Undergraduate teaching assistant, Brown University

Diversity of Life Fall, 2014
Instructor of record: Dr. James Kellner

Plant Physiological Ecology Fall, 2013
Instructor of record: Dr. Erika Edwards

8 Mentorship

STEM and fellowships tutor

Adams House, Harvard College 2016 - 2020

Research mentor

Diego Ramirez, undergraduate student, Yale University 2023-present
River Abedon, undergraduate student, Yale University 2023-present
Nicole Márquez, undergraduate summer intern, Harvard E3 REU program Summer, 2019
Rebecca Izen, graduate rotation student Summer, 2018

Peer mentor, Harvard E3 REU program

Macy Petrula, undergraduate summer intern Summer, 2019

9 Additional Training

Writing + Editing for Wikipedia, Harvard University J-term course 2020
Workshop for EvoAllies with Dr. Sherry Marts, Evolution 2019
Breaking the Ice: Building an Inclusive Classroom from Day One, Bok Center, Harvard University 2019
Gender Pronouns Workshop, Bok Center, Harvard University 2019

10 Additional Leadership and Service

Red Cliffs Audubon Society BirdFest tour leader, UT	2022
Spanish language free youth code camp, UT	2021
Bilingual mentoring program, Evolution	2021
Native plants at Harvard, funded project with the Office of Sustainability, Harvard	2019 - 2020
Graduate student council member, Society for Systematic Biology	2018 - 2020
Evo-ally, Evolution	2019, 2022
Founder, program director, and English teacher, Boston Cambridge English Class, MA	2015 - 2019
Head coordinator, Graduate Professional Development Seminar, Harvard	2016 - 2019
Graduate student representative, OEB Seminar Committee, Harvard	2015 - 2016
English teacher for adults, Olneyvill ESOL, RI	2012 - 2015
Latter-Day Saint service missionary to Sonora, Mexico	2010 - 2012

11 Additional Research Experience

Undergraduate research fellow, siphonophore collections assistant manager Working with Dr. Casey Dunn	2012 - 2015
Undergraduate research fellow, Erika Edwards Lab Working with Dr. Erika Edwards	2013 - 2015
Summer research intern, Andreas Hejnol Group Working with Dr. Andreas Hejnol and Dr. Joseph Ryan	Summer, 2013

12 Skills

Languages: Fluent in English, Spanish, and Portuguese

Bioinformatics: Proficient in R, python, d3, javascript, html, perl, bash, and Adobe Illustrator

Research: Experience in field collection of invertebrates and plants. Proficient in next-generation sequencing, and on ultramicrotome, transmission electron microscope, and confocal microscope.