

# Dr. Shayla Salzman

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I study the effects of species interactions on evolutionary trajectories utilizing the coevolved brood site pollination mutualism between endangered cycads and their pollinators. My research integrates across scientific disciplines to answer fundamental questions about the evolution of biodiversity and conservation biology.



## Current Position

**National Science Foundation Postdoctoral Research Fellow in Biology** Specht and Raguso Labs, School for Integrative Plant Sciences and the Department of Neurobiology and Behavior, Cornell, 2019-present

## Education

**Harvard University** 2019  
Ph.D. in Organismic and Evolutionary Biology  
*Ecology and evolution of cycads and their symbionts*  
Advisors: Prof. Naomi Pierce and Prof. Robin Hopkins  
Funding: National Science Foundation Graduate Research Fellowship

**University of California, Berkeley** 2012  
B.S. in Genetics and Plant Biology  
*Alternative oxidase gene expression during *Macrozamia lucida* thermogenesis*  
Advisor: Prof. Chelsea Specht  
Honors, High Distinction, Major Citation Award

## Professional Experience

**Laboratory Technician** Pierce Lab, Department of Organismic and Evolutionary Biology, Harvard, 2013

**Staff Research Associate & Lab Manager** Specht Lab, Department of Plant and Microbial Biology, University of California, Berkeley, 2012-2013

**Undergraduate Laboratory Assistant** Specht Lab under Dr. Tanya Renner, Department of Plant and Microbial Biology, University of California, Berkeley, 2011

**Undergraduate Study Manager** Altieri Lab under Dr. Albie Miles, Department of Environmental Science, Policy, and Management, University of California, Berkeley, 2010-2011

**Senior Agriculture Research Assistant** under Dr. Lucia Varella, Sonoma County University of California Cooperative Extension, 2006-2008

## Honors and Awards

Schmidt Science Fellowship Finalist 2018  
Distinction in Teaching Award, Derek Bok Center for Teaching at Harvard University 2018  
Arthur K. Bell Award, Brain Chemistry Labs at the Institute for EthnoMedicine 2017  
Grady L. Webster Plant Systematics Publication Award, American Society of Plant Taxonomist 2016  
Major Citation Award, University of California Berkeley Genetics and Plant Biology 2012  
Udall Scholar Honorable Mention, Udall Foundation 2011

## Publications

**Salzman S, Crook D, Calonje M, Stevenson DW, Pierce NE, Hopkins R. 2021.** Cycad-weevil pollination symbiosis is characterized by rapidly evolving and highly specific plant-insect chemical communication. *Frontiers in Plant Sciences*. 12:639368.

- Valencia-Montoya WA, Quental TB, Tonini JFR, Talvera G, Crall JD, Lamas G, Busby RC, Carvalho APS, Morais AB, Mega NO, Romanowski HP, Liénard MA, **Salzman S**, Whitaker MRL, Kawahara AY, Lohman DJ, Robbins RK, Pierce NE. 2021. Evolutionary tradeoffs between male secondary sexual traits revealed by a phylogeny of the hyperdiverse tribe Eumaeini (Lepidoptera: Lycaenidae). *Proceedings of the Royal Society B*. 288: 20202512.
- Liénard MA, Bernard, GD, Allen, AA, Lassance JM, Song S, Childers RR, Yu N, Ye D, Stephenson A, Valencia-Montoya WA, **Salzman S**, Whitaker MRL, Calonje M, Zhang F, Pierce NE. 2021. The evolution of red color vision is linked to coordinated rhodopsin tuning in lycaenid butterflies. *PNAS*. 118: e2008986118.
- Whitaker MRL, **Salzman S**, Gratacos X, Tucker Lima J. 2020. Localized overabundance of an otherwise rare butterfly threatens endangered cycads. *Florida Entomologist*. 103:519-522. \*Cover article.
- Whitaker MRL\*, **Salzman S**\*. 2020. Ecology and Evolution of cycad-feeding Lepidoptera. *Ecology Letters* 23: 1862-1877 \*Authors contributed equally to this work. Cover article.
- Salzman S**, Crook D, Crall J, Hopkins R, Pierce NE. 2020. An ancient push-pull pollination mechanism in cycads. *Science Advances* 6: eay6169
- Whitaker MRL, Baker CCM, **Salzman S**, Martins DJ, Pierce NE. 2019. Combining stable isotope analysis with DNA metabarcoding improves inferences of trophic ecology. *PloS one* 14: e0219070
- Hua C, **Salzman S**, Pierce NE. 2018. A first record of *Anatrachyntis badia* (Hodges1962) (Lepidoptera: Cosmopterigidae) on *Zamia integrifolia* (Zamiaceae). *Florida Entomologist* 101: 335-338
- Salzman S**, Whitaker MRL, Pierce NE. 2018. Cycad-feeding insects share a core gut microbiome. *Biological Journal of the Linnean Society* 123: 728-738
- Bruenn R, Lavenburg V, **Salzman S**. 2017. Don't judge a plant by its flowers. *Frontiers for Young Minds* 5:31 Doi: 10.3389/frym.2017.00031
- Whitaker MRL, **Salzman S**, Sanders J, Kaltenpoth M, Pierce N. 2016. Microbial communities of Lycaenid butterflies do not correlate with larval diet. *Frontiers in Microbiology* 7:1920. Doi: 10.3389/fmicb.2016.01920
- André T, **Salzman S**, Wendt T, Specht CD. 2016. Speciation dynamics and biogeography of Neotropical spiral gingers (Costaceae). *Molecular Phylogenetics and Evolution* 103: 55-63
- Andre T, Specht CD, **Salzman S**, Palma-Silva C, Wendt T. 2015. Evolution of species diversity in the genus *Chamaecostus* (Costaceae): molecular phylogenetics and morphometric approaches *Phytotaxa* 204: 265-276
- Salzman S**, Driscoll HE, Renner T, André T, Shen S, Specht CD. 2015. Spiraling into History: a molecular phylogeny and investigation of biogeographic origins and floral evolution for the genus *Costus*. *Systematic Botany* 40:104-115  
\*Winner Grady L. Webster Award for best plant systematics publication for 2014-2015
- Espeland M, Hall JPW, DeVries PJ, Lees DC, Cornwall M, Hsu YF, Wu LW, Campbell DL, Talavera G, Vila R, **Salzman S**, Ruehr S, Lohman DJ, Pierce NE. 2015. Ancient Neotropical origin and recent recolonization: Phylogeny, biogeography and diversification of the *Riodinidae* (Lepidoptera: Papilionoidea). *Molecular Phylogenetics and Evolution* 93: 296-306

## Publications in Review

- Glos RAE, **Salzman S**, Calonje M, Vovides AP, Tomlinson PB, Gandolfo MA, Specht CD. A phylogenetic and geographic analysis of leaflet anatomy in *Zamia* (Cycadales: Zamiaceae). *The Botanical Review*.
- Almeida de Jesus D, Batista DM, **Salzman S**, Carvalho LM, Santana K, André T. Structural changes and adaptive evolutionary constraints in the FLOWERING LOCUS T and TERMINAL FLOWER1-like genes of flowering plants. *Plant Molecular Biology*.

## Teaching Experience

### Guest Lectures

- Biology** Met Highschool, 4 guest lectures, 2021
- Plant-animal interactions** Colorado Mesa University, 2020
- Model-based phylogenetics** Cornell University, 2020

### Harvard University

- Evolution** *Teaching Fellow* 2017
- Science and shaping policy** *Course Designer and Instructor* 2015
- Writing fellowship and grant proposals for the biological sciences** *Teaching Fellow* Harvard, 2014
- Certificate for Distinction in Teaching** Derek Bok Center for Teaching 2017

### High School and Inmate

- Math, Science** *Teaching Assistant* Connelly Detention Center, Juvenile Justice, Department of Youth Services Boston, 2014–2015
- Chemistry, Biology** *Teaching Assistant* California College Preparatory Academy, 2010

### Pedagogical Training

- Online Learning Institute** Cornell Center for Teaching Innovation 2021
- Inclusive Teaching Workshop Series** Cornell Project Biodiversify 2021
- Teaching & Learning in the Diverse Classroom certificate** Cornell Center for Teaching Innovation 2020
- Teaching certificate** Derek Bok Center for Teaching at Harvard University 2019

## Mentoring Experience

### Cornell University

- Undergraduate laboratory mentoring\*** Rosy Glos 2019–2021

### Harvard University

- Undergraduate laboratory mentoring\*** Catherine Hua 2015–2019
- High school student laboratory mentoring\*** Sophie Reuhr 2013–2014

### University of California, Berkeley

- Undergraduate laboratory mentoring** Rose Radford, Anabel Rivas, and Camila Torres 2010–2011
- Undergraduate laboratory mentoring** Olivia Cope, Colin Hill 2011–2013

\*Resulted in publication for mentee

### Mentor Training

- Building Mentoring Skills for an Academic Career certificate** Cornell Center for the Integration of Research, Teaching, and Learning 2020
- Mentor Training certificate** Harvard University Science Education 2019

## Service and Outreach

### Board Service

- The Cycad Society** Board of Directors 2014–present
- Cambridge Entomological Club** Elected Vice-president 2014–2015, President 2015–2016, Executive Board 2016–2017, Treasurer 2017–2019
- Harvard Science Policy Group** Executive Board 2014–2016

### Public Presentations

- Cambridge Entomological Club** 2016 Presentation *The President's Address: Mechanisms of a Neotropical Coevolution: Plant-Insect Communication in a Cycad-Weevil Symbiosis*
- Frontiers for Young Minds** 2016 Live Review Presentation *Don't Judge a Plant by its Flowers*

Redwood Empire Nursery Growers Association 2008 Presentation *Light Brown Apple Moth*

### Popular Science Publications

The Cycad Society 2018 Article *Interview with Dennis Stevenson*

The Cycad Society 2014 Article *Our New Board Member, Shayla Salzman Describes her Research*

Hobby Farms Magazine Online Edition 2009 Article *Soil Contamination: A Farm Buyer's Primer*

### Invited Seminars

National Museum of Natural History Smithsonian Botany Department Seminar 2021. *The ecology and evolution of a cycad-weepil pollination mutualism*

Laval University Biology Department Seminar 2021. *The ecology and evolution of a cycad-weepil pollination mutualism*

Stonehill College Biology Department Seminar 2020. *Ecology and evolution of a cycad-weepil pollination mutualism*

Cornell University Plant Biology Department Seminar 2019. *Ecology and evolution of a cycad-weepil pollination mutualism*

Harvard University Organismic and Evolutionary Biology Symposium 2017. *Mechanisms of a gymnosperm pollinator coevolution: plant-insect communication in a cycad-weepil symbiosis*

National Institute of Amazonian Research (INPA) Brazil Herbarium Seminar 2015 *Mechanisms of a Neotropical coevolution: plant-insect communication and specificity of Zamia pollination*

Federal University of Pará State Santarém (UFOPA) Brazil Evolution Seminar 2015 *Coevolution in a Neotropical pollination mutualism*

University of California, Berkeley College of Natural Resources Honor's Symposium 2012. *Gene expression during Macrozamia lucida thermogenesis*

### Conference Presentations

Glos R, Salzman S, Calonje M, Vovides A, Specht CD. 2020. *A phylogenetic and geographic analysis of leaflet anatomy in Zamia (Cycadales: Zamiaceae)* International Botany Conference (poster)

Salzman S, Whitaker M, Pierce NE. 2018. *Cycad-feeding insects share a core gut microbiome* Plant Biology Initiative at Harvard University 9<sup>13</sup><sup>th</sup> Annual Plant Biology Symposium (poster)

Salzman S, Whitaker M, Pierce NE. 2017. *Assessing the potential for bacterial degradation of BMAA in the guts of cycad feeding insets* International BMAA Conference (poster)

\*Winner Arthur K. Bell Award

Hua C, Salzman S, Pierce NE. 2017. Is *Anatrachyntis* another insect radiation onto cycads? Harvard College's Undergraduate Research Spotlight (poster)

Salzman S. 2015. *Mechanisms of a Neotropical coevolution: plant-insect communication and specificity of Zamia pollination* Cycad X: 10<sup>th</sup> International Conference on Cycad Biology

Salzman S. 2015. *Plant-insect communication and Rhopalotria-Zamia mutualism* International Evolution Conference

Salzman S, Yockteng R, Terry I, Specht CD. 2014 *Varying alternative oxidase gene expression during Macrozamia lucida thermogenesis suggests transcriptional regulation* Plant Biology Initiative at Harvard University 9<sup>th</sup> Annual Plant Biology Symposium (poster)

Salzman S, André T, Specht CD. 2013. *Spiraling into History: A Molecular phylogeny, biogeography, and ancestral character state reconstruction of distribution and pollination syndrome for Costus (Costaceae)* Monocots V: 5<sup>th</sup> International Conference on Comparative Biology of Monocotyledons (poster)

Salzman S. 2009. *Bioremediation of Nitrate in Wastewater* MESA (Math, Engineering, and Science Achievement) poster session Santa Rosa Junior College (poster)

**Grants, Fellowships and Scholarships**

National Science Foundation Postdoctoral Research Fellowship in Biology	\$207,000
Harvard Museum of Comparative Zoology Barbour Fund 2015	\$2,500
Society for the Study of Evolution 2015	\$500
Cycad Society 2015	\$500
National Science Foundation Graduate Research Fellowship 2014	\$96,000
Berkeley Scholarship 2012	\$14,212
Harry L. Wollenberg scholarship 2010	\$7072
Federal Smart Grant 2010	\$4000
Esta M. Rodkey Scholarship 2010	\$500
Rotary Club of Santa Rosa Foundation Scholarship 2010	\$1,500
American Association of University Women Scholarship 2010	\$2,500
Cal Alumni Club of Oakmont Scholarship 2010	\$1,500
SRJC Alumni and Friends Honoring Dr. Roy G. Mikalson Scholarship 2010	\$1,500
Paul Mancini Memorial Agriculture Scholarship 2010	\$600
Luther Burbank Botany Scholarship 2010	\$800
Clark Nattkemper Science Education Scholarship 2010	\$500
American Business Women's Association 2009	\$750
Luther Burbank Botany Scholarship 2009	\$450
Doyle Scholarship 2008	\$1,600
Dr. Pearl Konttas Continuing Student Scholarship 2008	\$500
Luther Burbank Botany Scholarship 2008	\$600
Doyle Scholarship 2007	\$1,600
Dr. Pearl Konttas Continuing Student Scholarship 2007	\$450
Doyle Scholarship 2006	\$1,600
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	\$348,734

**Cycad-Related Collaborators**

Thiago André, Federal University of Pará, Brazil  
 Francisco Barona-Gomez, National Laboratory of Genomics for Biodiversity, Mexico  
 Michael Calonje, Montgomery Botanical Center, Florida  
 Angélica Cibrián-Jaramillo, National Laboratory of Genomics for Biodiversity, Mexico  
 Paul Cox, Brain Chemistry Labs at the Institute for EthnoMedicine  
 Damon Crook, United States Department of Agriculture  
 Dennis Stevenson, New York Botanical Garden  
 William Tang, United States Department of Agriculture  
 Alberto Taylor, University of Panama  
 Irene Terry, University of Utah  
 Melissa Whitaker, Swiss Federal Institute of Technology, Zurich

**Cycad-Related Field Work**

Florida, USA	Biannually 2014–2019
Mexico	2017
Panama	2015
Colombia	2015
Brazil	2015