

# STEPHANIE J. SPIELMAN, PHD

## CONTACT INFORMATION

---

Email [stephanie.spielman@gmail.com](mailto:stephanie.spielman@gmail.com)  
ORCID <http://orcid.org/0000-0002-9090-4788>  
Website <https://sjspielman.github.io>  
Github <https://www.github.com/sjspielman>

## POSITIONS

---

<b>Data Scientist</b> Childhood Cancer Data Lab, Alex's Lemonade Stand Foundation	2022–Present
<b>Assistant Professor</b> Department of Biological Sciences, Rowan University	2018–2022
<b>Research Assistant Professor (Postdoctoral level)</b> Institute for Evolutionary Genomics and Medicine, Temple University	2016–2018

## EDUCATION

---

<b>The University of Texas at Austin</b> Ph.D. in Ecology, Evolution, and Behavior, Department of Integrative Biology Research focus in Computational Molecular Evolution Advisor: Claus O. Wilke, PhD	2011–2016
<b>Brown University</b> Sc.B. in Biology, with Honors Concentration in Ecology and Evolutionary Biology Advisor: Daniel M. Weinreich, PhD	2006–2010

## PEER-REVIEWED PUBLICATIONS

---

29. EM Moore, DL Martinez, N Srivastava, SM Morrison, and **SJ Spielman**. 2022. “Mineral Element Insiders and Outliers Play Crucial Roles in Biological Evolution.” *Life*. 12(7):951.
28. EM Moore, JJ Golden, SM Morrison, J Hao, and **SJ Spielman**. 2022. “The expanding network of mineral chemistry throughout earth history reveals global shifts in crustal chemistry during the Proterozoic.” *Scientific Reports*. 12:4956.
27. **SJ Spielman** and ML Miraglia. 2021. “Relative model selection of evolutionary substitution models can be sensitive to multiple sequence alignment uncertainty.” *BMC Ecology and Evolution*. 21:214.

26. N Srivastava\*, **SJ Spielman**, S Morrison, and EK Moore. 2021. “Geological factors that impacted cadmium availability to be used as an alternative cofactor for zinc in the carbon fixation pathways of marine diatoms.” *Journal of Geophysical Research: Biogeosciences*. 126(2): e2020JG005966. Highlighted “Research Spotlight” article in Eos: Science News by AGU.
25. **SJ Spielman** and EK Moore. 2020. “dragon: A New Tool for Exploring Redox Evolution Preserved in the Mineral Record.” *Frontiers in Earth Science*. 8:414.
24. **SJ Spielman**. 2020. “Relative Model Fit Does Not Predict Topological Accuracy in Single-Gene Protein Phylogenetics.” *Molecular Biology and Evolution*. 37(7):2110-2123.
23. EK Moore, J Hao, **SJ Spielman**, and N Yee. 2020. “The Evolving Redox Chemistry and Bioavailability of Vanadium in Deep Time.” *Geobiology*. 00:1-12.
22. SL Kosakovsky Pond, AFY Poon, R Velazquez, S Weaver, N Lance Hepler, B Murrell, SD Shank, B Rife Magalis, D Bouvier, A Nekrutenko, S Wisotsky, **SJ Spielman**, SDW Frost, SV Muse. 2020. “HyPhy 2.5 – a customizable platform for evolutionary hypothesis testing using phylogenies.” *Molecular Biology and Evolution*. 37(1): 295-299.
21. **SJ Spielman**, S Weaver, SD Shank, BR Magalas, M Li, and SL Kosakovsky Pond. 2019. “Evolution of viral genomes: Interplay between selection, recombination and other forces.” *Evolutionary Genomics. Methods in Molecular Biology, vol 1910*. Humana Press, New York, NY.
20. R Maddamsetti, DT Johnson, **SJ Spielman**, KL Petrie, DS Marks, and JR Meyer. 2018. “Viral gain-of-function experiments uncover residues under diversifying selection in nature.” *Evolution*. 72: 2234-2243.
19. **SJ Spielman** and SL Kosakovsky Pond. 2018. “Relative evolutionary rates in proteins are largely insensitive to the substitution model.” *Molecular Biology and Evolution*. 35(9): 2307–2317.
18. **SJ Spielman** and SL Kosakovsky Pond. 2018. “Relative evolutionary rate inference in HyPhy with LEISR.” *PeerJ* 6: e4339.
17. **SJ Spielman**. 2018. “phyphy: Python package for facilitating the execution and parsing of HyPhy standard analyses.” *Journal of Open Source Software* 3(21): 514.
16. S Weaver, SD Shank, **SJ Spielman**, M Li, SV Muse, and SL Kosakovsky Pond. 2018. “Datamonkey 2.0: A modern web application for characterizing selective and other evolutionary processes.” *Molecular Biology and Evolution* 35(3): 773-777.
15. DK Sydykova, BR Jack, **SJ Spielman**, and CO Wilke. 2018. “Measuring evolutionary rates of proteins in a structural context.” *F1000Research* 6:1845.
14. EL Jackson, **SJ Spielman**, and CO Wilke. 2017. “Computational prediction of the tolerance to amino-acid deletion in green-fluorescent protein.” *PLOS ONE* 12(4): e0164905.
13. Z Kadlecova, **SJ Spielman**, D Loerke, A Mohanakrishnan, DK Reed, and SL Schmid. 2017. “Regulation of clathrin-mediated endocytosis by hierarchical allosteric activation of AP2.” *Journal of Cell Biology* 216(1): 167–179.
12. **SJ Spielman**, S Wan\*, and CO Wilke. 2016. “A comparison of one-rate vs. two-rate frameworks for site-specific dN/dS estimation.” *Genetics* 204(2): 499–511.
11. **SJ Spielman** and CO Wilke. 2016. “Extensively parameterized mutation–selection models reliably capture site-specific selective constraint.” *Molecular Biology and Evolution* 33(11): 2990–3002.
10. EL Jackson, A Shahmoradi, **SJ Spielman**, BR Jack, and CO Wilke. 2016. “Intermediate divergence levels maximize the strength of structure–sequence correlations in enzymes and viral proteins.” *Protein Science* 25(7): 1341–1353.

9. J Echave, **SJ Spielman**, and CO Wilke. 2016. “Causes of evolutionary rate variation among protein sites.” *Nature Reviews Genetics* 17: 109–921.
8. **SJ Spielman** and CO Wilke. 2015. “Pyvolve: A flexible Python module for simulating sequences along phylogenies.” *PLOS ONE* 10(9): e0139047.
7. AG Meyer, **SJ Spielman**, T Bedford, and CO Wilke. 2015. “Time dependence of evolutionary metrics during the 2009 pandemic influenza virus outbreak.” *Virus Evolution* 1(1): vev006–60.
6. **SJ Spielman**, K Kumar\*, and CO Wilke. 2015. “Comprehensive, structurally-curated alignment and phylogeny of vertebrate biogenic amine receptors.” *PeerJ* 3: e773.
5. **SJ Spielman** and CO Wilke. 2015. “The relationship between  $dN/dS$  and scaled selection coefficients.” *Molecular Biology and Evolution* 32(4): 1097–7108.
4. A Shahmoradi, Sydykova DK\*, **SJ Spielman**, EL Jackson, ET Dawson\*, AG Meyer, and CO Wilke. 2014. “Predicting evolutionary site variability from structure in viral proteins: buriedness, flexibility, and design.” *Journal of Molecular Evolution* 79: 130–042.
3. **SJ Spielman**, Dawson ET\*, and CO Wilke. 2014. “Limited utility of residue masking for positive-selection inference.” *Molecular Biology and Evolution* 31(9): 2496–6500.
2. MZ Tien\*, AG Meyer, DK Sydykova\*, **SJ Spielman**, and CO Wilke. 2013. “Maximum allowed solvent accessibilities of residues in proteins.” *PLOS ONE* 8(11): e80635.
1. **SJ Spielman** and CO Wilke. 2013. “Membrane environment imposes unique selection pressures in transmembrane domains of G-protein coupled receptors.” *Journal of Molecular Evolution* 76(3): 172–282.

\*Denotes undergraduate co-author.

## PREPRINTS AND SUBMITTED MANUSCRIPTS

---

2. J Shapiro et al. 2022. “OpenPBTA: An Open Pediatric Brain Tumor Atlas.” *bioRxiv*. <https://doi.org/10.1101/2022.09.13.507832>.
1. **SJ Spielman**<sup>†</sup>, AG Meyer<sup>†</sup>, and CO Wilke. 2014. “Increased evolutionary rate in the 2014 West African Ebola outbreak is due to transient polymorphism and not positive selection.” *bioRxiv*. <https://doi.org/10.1101/011429>. <sup>†</sup>Authors contributed equally to this work.

\*Denotes undergraduate co-author.

## AWARDS AND HONORS

---

<b>President’s Award for Excellence in Innovative Instructional Delivery</b> Faculty Center for Teaching Excellence, Rowan University	2021
<b>Outstanding Dissertation Award</b> Office of Graduate Studies, The University of Texas at Austin <i>Awarded to top dissertation across all of science, math, and engineering</i>	2016
<b>Graduate Student Professional Development Award</b> Office of Graduate Studies, The University of Texas at Austin	2015
<b>Graduate Dean’s Prestigious Fellowship Supplement Award</b> Office of Graduate Studies, The University of Texas at Austin	2015

<b>EEB Blair Endowment Travel Award</b> Department of Integrative Biology, The University of Texas at Austin	2015
<b>Outstanding Teaching Award</b> Biology Instructional Office, The University of Texas at Austin	2014
<b>EEB Travel Award</b> Department of Integrative Biology, The University of Texas at Austin	2013
<b>SMBE Graduate Student Travel Award</b> Society for Molecular Biology and Evolution	2013
<b>Integrative Biology Graduate Recruitment Fellowship</b> Department of Integrative Biology, The University of Texas at Austin	2011
<b>Karen T. Romer Undergraduate Teaching and Research Award</b> Brown University	2009

## FUNDING AND GRANTS

---

<b>NSF OAC2126227</b> Senior Personnel (through 01/2022). “CC* Planning: Advanced Cyberinfrastructure for Teaching and Research at Rowan University and the Southern New Jersey Region.”	09/2021 – 08/2022
<b>NSF EAR2020520</b> CO-PI (\$319,227; 50%. Through 01/2022). “dragon-phire: Deep-time Redox Analysis of the Geobiology Ontology Network - Protein Hardware Integrates Redox Evolution.”	08/2020 – 07/2023
<b>Rowan University Seed Funding Program</b> CO-PI (\$10,000; 50%). “Developing and Applying a New Web-Based Platform for Investigating the Coevolution of the Geosphere and Biosphere.”	07/2019 – 06/2022
<b>Alex’s Lemonade Stand Foundation</b> PI (\$16,760.00; 100%). “OpenPBTA Analysis Site.”	01/2020 – 07/2021
<b>NIGMS/NIH F31-GM113622 (NRSA)</b> PI. “Software development and application of a simulation framework for protein evolution.”	05/2015–05/2016

## CONFERENCE ABSTRACTS

---

**OMIC-14. OPENPBTA: AN OPEN PEDIATRIC BRAIN TUMOR ATLAS.**  
Contributed Abstract to *Society for Neuro-Oncology’s 6th Pediatric Neuro-Oncology Basic and Translational Research Conference*, 2021. <https://doi.org/10.1093/neuonc/noab090.161>

## PRESENTATIONS AND POSTERS

---

**Seeking a connection between protein models and evolutionary processes**  
Invited talk at Models of Genome Evolution from Populations to Species Symposium, 2021.  
Virtual event hosted by the Swedish Collegium for Advanced Study, Uppsala, Sweden.

**Relative model selection can be sensitive to multiple sequence alignment uncertainty.**  
Contributed Poster at SMBEv2021.

**Leveraging population-genetics-informed models to improve the reliability of simulation studies in molecular evolution.**  
Accepted Poster at SMBE 2020. *Conference canceled due to COVID-19.*

**Cautionary tales in phylogenetic model selection.**  
Invited Research Seminar at Rutgers University, 2019.  
Rutgers University, New Brunswick, NJ.

**Cautionary tales in protein phylogenetic modeling.**  
Invited Research Seminar at West Chester University, 2019.  
West Chester University, West Chester, PA.

**Testing the role of model selection in phylogenetic accuracy.**  
Contributed Talk at the Society for the Study of Evolution Meeting, 2019.  
Providence, RI.

**dragon: An interactive web-based platform to explore mineral-chemistry networks in deep-time.**  
Contributed Talk at ENIGMA Astrobiology Symposium, 2019.  
Rutgers University, New Brunswick, NJ.

**Possibilities, pitfalls, and practical consequences of model selection procedures in phylogenetics.**  
Invited Research Seminar at Dalhousie University, 2019.  
Halifax, Nova Scotia, Canada.

**Introduction to Computational Molecular Evolution**  
“Research Spotlight” Invited Seminar at the Rowan University Biology Club, 2018.  
Rowan University, Glassboro, NJ.

**Probing the relative accuracy of mutation–selection inference platforms.**  
Contributed poster at SMBE 2017.  
Austin, TX.

**Uncovering the properties and limitations of models of sequence evolution.**  
Invited CIDID Seminar at Fred Hutchinson Cancer Research Center, 2016.  
Seattle, Washington.

**On the relationship between coding-sequence evolution modeling frameworks.**  
Contributed talk at SMBE 2015.  
Vienna, Austria.

**How limited data and transient polymorphism influence evolutionary sequence analysis**

**of EBOV genomes.**

Invited poster at *Modeling the Spread and Control of Ebola in West Africa: A Rapid Response Workshop*, 2014.

Georgia Institute of Technology, Atlanta, GA.

**Limited utility of residue masking for positive-selection inference.**

Contributed poster at *2nd Annual Symposium on Big Data in Biology*, 2014.

UT Austin, Austin, TX.

**The molecular evolution of membrane proteins.**

Contributed talk at SMBE Satellite Meeting MPEII, 2013.

University of Colorado, Aurora, CO.

**Membrane environment imposes unique selection pressures on GPCRs.**

Contributed poster at Annual BEACON Congress, 2013.

Michigan State University, East Lansing, MI.

## UNDERGRADUATE STUDENT POSTER PRESENTATIONS

---

**Exploring trends in the mineral-chemistry network.**

N Srivastava\* and SJ Spielman.

Contributed Poster at *SURP 2021*.

Rowan University, Glassboro, NJ.

**Developing a browser-based application for EEG analysis in the classroom.**

RC Wilson\*, ALM Hunt, and SJ Spielman.

Contributed Poster at *SURP 2021*.

Rowan University, Glassboro, NJ.

**An open-source R package for visualizing multiple sequence alignments.**

RT Demko\* and SJ Spielman.

Contributed Poster at *SURP 2021*.

Rowan University, Glassboro, NJ.

**Analysis of the genetic diversity of *Caulobacter crescentus* Phickviruses using *phoH* and thymidylate synthase as signature genes.**

A Cruz\*, A Vincent\*, SJ Spielman, MA Randa, and GB Hecht.

Contributed Poster at *ABRCMS 2020*.

Virtual Conference.

**Protein models affect measures of evolutionary divergence.**

FK Picone\* and SJ Spielman.

Contributed Poster at *COURI 2019*.

Rowan University, Glassboro, NJ.

**Phylogenetic model selection is sensitive to alignment quality.**

M Miraglia\* and SJ Spielman.

Contributed Poster at *COURI 2019*.  
Rowan University, Glassboro, NJ.

**Investigating the role of Cadmium within the biosphere and geosphere in deep time.**  
N Srivastava\*, SJ Spielman, and EK Moore.  
Contributed Posters at *RUSSS 2019* and *COURI 2019*.  
Rowan University, Glassboro, NJ.

**Analysis of motif distributions in regions of endocytic proteins.**  
C Bethell\* and SJ Spielman.  
Contributed Poster at *RUSSS 2019*.  
Rowan University, Glassboro, NJ.

\* Denotes undergraduate co-author.

## TEACHING EXPERIENCE

---

<b>Instructor, Instruction to Data Science in R Workshop</b>	Summer 2020
Cumberland Bridges to Rowan (CB2R) Program, Rowan University	

<b>Instructor, Data Science for Biologists</b>	Spring 2020 – Fall 2021
Rowan University	

<b>Instructor, Special Topics: Pathogen Evolution</b>	Fall 2020
Rowan University	

<b>Guest Lecturer, Statistical Genetics</b>	November 6, 2019
Villanova University	

<b>Instructor, Introduction to Evolution and Scientific Inquiry</b>	Fall 2018 – Spring 2020
Rowan University	

<b>Lead Instructor, Introduction to Python</b>	May 2015, 2016, 2018
Big Data in Biology Summer School	
Center for Computational Biology and Bioinformatics, The University of Texas at Austin	

<b>Instructor, Genomics and Evolutionary Medicine (Graduate Level)</b>	Spring 2018
Temple University	

<b>Instructor, Functional Ecological Genomics Workshop</b>	May 24–26, 2017
Lacawac Sanctuary	

<b>Instructor, Biostatistics (Graduate Level)</b>	Fall 2017
Temple University	

**Co-instructor, Peer-led Introduction to Biocomputing** Spring 2015, 2016  
Center for Computational Biology and Bioinformatics, The University of Texas at Austin

**Teaching Assistant, Computational Biology and Bioinformatics** Spring 2015  
Department of Statistics and Data Science, The University of Texas at Austin  
Supervisor: Dr. Claus Wilke

**Co-instructor, Introduction to Python** May 2014  
Big Data in Biology Summer School  
Center for Computational Biology and Bioinformatics, The University of Texas at Austin

**Teaching Assistant, Evolution** Spring 2013  
Department of Integrative Biology, The University of Texas at Austin  
Supervisors: Dr. Mark Kirkpatrick and Dr. C. Randal Linder

**Teaching Assistant, Biostatistics** Fall 2012, 2013  
Department of Statistics and Data Science, The University of Texas at Austin  
Supervisor: Dr. Claus Wilke

**Teaching Assistant, Evolutionary Biology** Fall 2009  
Department of Biology, Brown University  
Supervisor: Dr. Chris Organ

## ACADEMIC SERVICE AND OUTREACH

---

**Invited Career Panelist** June 26, 2021  
iEvoBio Virtual Meeting 2021

**Invited Panelist** March 2021  
Montana State University Molecular Biosciences Program Virtual Career Panel

**Invited Career Panelist** Canceled due to COVID-19  
iEvoBio Meeting 2020

**Invited Career Panelist** June 26, 2019  
iEvoBio Meeting 2019  
Providence, RI

**American Society of Naturalists Ruth Patrick Student Award Judge** June 2019  
Society for the Study of Evolution Meeting  
Providence, RI

**Steering Committee Member and Advisor** Fall 2017 – Spring 2018  
Professional Science Masters in Bioinformatics Program



Temple University

### **Society Memberships**

*Society for Molecular Biology and Evolution, Society for the Study of Evolution*

### **Peer Reviewer**

*eLife, Molecular Biology and Evolution, Systematic Biology, Genome Biology and Evolution, Virus Evolution, Molecular Phylogenetics and Evolution, PLoS Computational Biology, Bioinformatics, BMC Evolutionary Biology, BMC Bioinformatics, PeerJ, Philosophical Transactions of the Royal Society B, Genes, Journal of Molecular Evolution*