Molly Schumer
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POSITIONS

Assistant Professor, Stanford University, 9/2019 - present
Hanna H. Gray Fellow, HHMI, 9/2017 - present
Junior Fellow, Harvard Society of Fellows, 7/2016 - 8/2019
Postdoctoral researcher, Columbia University, 2/2016 - 1/2017

EDUCATION

BA (Phi Beta Kappa), Reed College, Portland, Oregon, 2005 - 2009.

PhD, Princeton University, Princeton, New Jersey, 2011 - 2016
Ecology and Evolutionary Biology, February 2016

AWARDS AND FELLOWSHIPS

2021	Alfred P. Sloan Fellowship
2020	Alden H. and Winifred Brown Faculty Fellow, Stanford University
2019	Rosalind Franklin Young Investigator Award, Genetics Society of America
2018	Atwood colloquium: Rising Star in Evolutionary Biology
2017	Theodosius Dobzhansky Prize, Society for the Study of Evolution
2016	NSF Postdoctoral Research Fellowship in Biology (*declined*)
2015	Helen Hay Whitney Postdoctoral Fellowship (*declined*)
2013	Walbridge Award, Princeton Environmental Institute
2013	Student Research Award, Society for Animal Behavior
2013	Vern Parish Award, American Livebearer Association
2012	Graduate Research Award, Society for Systematic Biology
2012	Rosemary Grant Award, Society for the Study of Evolution
2011-2016	Centennial Fellowship in the Sciences and Engineering
2011-2014	National Science Foundation Graduate Research Fellowship
2009	Society for Integrative and Comparative Biology, Best Student Poster
2007	James F. and Marion L. Miller Foundation Research Award Recipient
2007	Goldwater Scholarship

GRANTS

2021	Pew Scholars Program - Unraveling the tangled web: the genetic consequences of hybridization (Principal Investigator)
2021	Searle Scholars Program - Genetic collision: hybridization and its consequences (Principal Investigator)
2020	HFSP Young Investigator Grant - Chance or curse? The consequences of hybridization in a changing world (Lead Investigator)
2019	NIH R35 - The population genomics of hybridization: from adaptation to genome evolution (Principal Investigator)

2018 ECR Catalyst grant - Linking deforestation to Schistosoma hybridization and low parasite clearance (Co-Investigator)
2017 L'Oréal USA for Women in Science Fellow
2017 Hanna H. Gray Fellow - Howard Hughes Medical Institute
2017 Harvard University Milton Fund Awardee
2014-2016 National Science Foundation Doctoral Dissertation Improvement Grant

PUBLICATIONS

[+]Corresponding author
*Co-first authors
[§]Co-supervised work
Lab member

32. Moran, B.M.[+], Payne, C.Y., Powell, D.L., Iverson, E.N.K., Banerjee, S.M., Langdon, Q.K., Gunn, T., Liu, F., Matney, R., Singhal, K., Leib, R.D., Hernandez-Perez, O., Corbett-Detig, R., Havird, J.D., **Schumer, M.**[+] (2021). A Lethal Genetic Incompatibility between Naturally Hybridizing Species in Mitochondrial Complex I. *bioRxiv*. doi: https://doi.org/10.1101/2021.07.13.452279

31. Langdon, Q.K.[+], Powell, D.L., Kim, B., Banerjee, S.M., Payne, C., Dodge, T.O., Moran, B., Fascinetto-Zago, P., **Schumer, M.**[+] (2021). Predictability and parallelism in the contemporary evolution of hybrid genomes. *bioRxiv*. doi: https://doi.org/10.1101/2021.07.06.451368.

30. Thompson, K.A., Peichel, C.L., Rennison, D.J., McGee, M.D., Albert, A.Y.K., Vines, T.H., Greenwood, A.K., Wark, A.R., Brandvain, Y., **Schumer, M.**, Schluter, D. (2021). Genetic evidence for environment-dependent hybrid incompatibilities in threespine stickleback. *bioRxiv*. doi: https://doi.org/10.1101/2021.06.24.449805.

29. Alves Cavassim, M.I., Baker, Z., Hoge, C., Schierup, M., **Schumer, M.**, Przeworski, M. (2021). PRDM9 losses in vertebrates are coupled to the loss of at least three other meiotic genes. *bioRxiv*. doi: https://doi.org/10.1101/2021.06.08.447603.

28. Powell, D., Payne, C.P., Banerjee, S., Keegan, M., Bashkirova, E., Cui, R., Andolfatto, P., Rosenthal, G.[§], **Schumer, M.** [§+] 2021. The Genetic Architecture of Variation in the Sexually Selected Sword Ornament and Its Evolution in Hybrid Populations. *Current Biology* https://doi.org/10.1016/j.cub.2020.12.049. [§]co-supervised

27. Moran, B.*, Payne, C.*, Langdon, Q., Powell, D., Brandvain, Y., **Schumer, M.**[+] 2021. The genomic consequences of hybridization. *eLife,* in press. doi: arXiv:2012.04077.

26. Powell, D.[+], Moran, B., Kim, B., Banerjee, S., Aguillon, S.M., Fascinetto-Zago, P., Langdon, Q., **Schumer, M.**[+] 2021. Two new hybrid zones expand the swordtail hybridization model system. *Evolution*, in press. *bioRxiv*. doi: https://doi.org/10.1101/2020.11.18.389205.

25. Powell, D., Garcia, M., Keegan, M., Reilly, P., Du, K., Diaz-Loyo, A., Moyaho-Martinez, A., Banerjee, S., Blakkan, D., Reich, D., Andolfatto, P., Rosenthal, G., Schartl, M., **Schumer, M**.[+] 2020. Natural hybridization reveals incompatible alleles causing melanoma in swordtail fish. *Science* doi:10.1126/science.aba5216.

24. **Schumer, M.**[+], Powell, D., Corbett-Detig, R.[+] 2020. Versatile simulations of admixture and accurate local ancestry inference with mixnmatch and ancestryinfer. *Molecular Ecology Resources* https://onlinelibrary.wiley.com/doi/abs/10.1111/1755-0998.13175.

23. Mateos M, Du K, Klopp C, Parrinello H, Garcia M, **Schumer, M.**, Jue N, Guiguen Y, Schartl M. 2019. Draft genome assembly and annotation of the Gila topminnow *Poeciliopsis occidentalis*. *Frontiers in Ecology & Evolution* doi: https://doi.org/10.3389/fevo.2019.00404.

22. **Schumer, M.**[+], Xu, C., Powell, D., Durvasula, A., Skov, L., Holland, C., Blazier, J.C., Sankararaman, S., Andolfatto, P., Rosenthal, G.G.R, Przeworski, M.[+] (2018) Natural selection interacts with recombination to shape the evolution of hybrid genomes. *Science* doi: 10.1126/science.aar3684.
F1000 recommended article

21. Rosenthal, G.G.R, **Schumer, M.**, Andolfatto, P. (2018) Letter: How the manakin got its crown: A novel trait that is unlikely to cause speciation. *PNAS* doi: https://doi.org/10.1073/pnas.1804061115.

20. **Schumer, M.**[+], Rosenthal, G.G.R., Andolfatto, P. (2017) What do we mean when we talk about hybrid speciation? *Heredity* doi:10.1038/s41437-017-0036-z.
2018 Editor's choice

19. **Schumer, M.**[+], Powell, D., Cui, R., Delclos, P., Squire, M., Andolfatto, P., Rosenthal, G. (2017) Assortative mating and persistent reproductive isolation in hybrids. *PNAS* doi: 10.1073/pnas.1711238114.

18. Baker, Z.*, **Schumer, M.***, Haba, Y., Holland, C., Rosenthal, G., Przeworski, M. (2017) Repeated losses of PRDM9-directed recombination despite the conservation of PRDM9 across vertebrates. *eLife* doi: 10.7554/eLife.24133. *co-first authorship

17. Cui, R., Delclos, P., **Schumer, M.**, Rosenthal, G. (2017) Early social learning triggers neurogenomic expression changes in a swordtail fish. *Proceedings Royal Society B* doi: 10.1098/rspb.2017.0701.

16. **Schumer, M.**, Brandvain, Y. (2016) Determining epistatic selection in admixed populations. *Molecular Ecology* doi: 10.1111/mec.13641.

15. **Schumer, M.**[+], Cui, R., Powell, D., Rosenthal, G., Andolfatto, P. (2016) Ancient hybridization and genomic stabilization in a swordtail fish. *Molecular Ecology* doi: 10.1111/mec.13602.

14. Cui, R., **Schumer, M.**, Rosenthal, G. (2016) Admix'em: A flexible framework for forward-time simulations of hybrid populations with selection and mate choice. *Bioinformatics* doi: 10.1093/bioinformatics/btv700.

13. **Schumer, M**.*[+], Cui, R.*, Rosenthal, G., Andolfatto, P. (2015) simMSG: an experimental design tool for high-throughput genotyping of hybrids. *Molecular Ecology Resources* doi: 10.1111/1755-0998.12434. *co-first authorship

12. Ghosh, R., Bloom, J.S., Mohammadi, A., **Schumer, M.**, Andolfatto, P., Ryu, W., Kruglyak, L. (2015) Genetics of Intra-Species Variation in Avoidance Behavior Induced by a Thermal Stimulus in Caenorhabditis elegans. *Genetics* doi:10.1534/genetics.115.178491.

11. **Schumer, M.**[+], Cui, R., Rosenthal, G., Andolfatto, P. (2015) Reproductive isolation of hybrid populations driven by genetic incompatibilities. *PLoS Genetics* doi:10.1371/journal.pgen.1005041.

10. **Schumer, M.**[+], Cui, R., Powell, D., Dresner, R., Rosenthal, G., Andolfatto, P. (2014) High-resolution Mapping Reveals Hundreds of Genetic Incompatibilities in Hybridizing Fish Species. *eLife* doi: http://dx.doi.org/10.7554/eLife.02535.
Featured in: Science News
The Naked Scientists podcast

9. **Schumer, M.**[+], Rosenthal, G., Andolfatto, P. (2014) How common is homoploid hybrid speciation? *Evolution* doi:10.1111/evo.12399.

8. Culumber, Z. W., **Schumer M**., Monks S., Tobler M. (2014) Environmental heterogeneity generates opposite gene-by-environment interactions for two fitness-related traits within a population. *Evolution* doi: 10.1111/evo.12574.

7. Cui, R., **Schumer, M.**, Kruesi, K., Walter, R., Andolfatto, P., Rosenthal, G. (2013) Phylogenomics reveals extensive reticulate evolution in *Xiphophorus* fishes. *Evolution* 67:2166-2179.

6. Renn, S.C.P. and **Schumer, M.** (2013) Genetic accommodation and behavioral evolution: insights from genomic studies. *Animal Behavior* 85: 1012-1022.
F1000 recommended article

5. **Schumer, M.**[+], Cui, R., Boussau, B., Walter, W., Rosenthal, G., Andolfatto, P. (2012) An evaluation of the hybrid speciation hypothesis for *Xiphophorus clemenciae* based on whole genome sequences. *Evolution* 67: 1155-1168.

4. Zhen, Y., Aardema, M.L., Medina, E.M., **Schumer, M.**, Andolfatto, P. (2012) Parallel molecular evolution in a herbivore community. *Science* 337:1634-1637.

3. **Schumer, M.**[+]*, Birger, R.[+]*, Tantipathananandh, C., Aurisano, J., Maggioni, M., Mwangi, P. (2012) Infestation by a Common Parasite is Correlated with Ant Symbiont Identity in a Plant-Ant Mutualism. *Biotropica* 45: 276-279. *co-first authorship

2. **Schumer, M.**, Krishnakant, K., and Renn, S.C.P. (2011) Comparative gene expression profiles for highly similar aggressive phenotypes in male and female cichlid fishes (*Julidochromis*). *Journal of Experimental Biology* 214:3269-3278.

1. Spengler, M., Kuropatwinski, K., **Schumer, M.** and Antoch, M. (2009) A serine cluster mediates BMAL1-dependent CLOCK phosphorylation and degradation. *Cell Cycle* 8:24, 4138-4146.

INVITED TALKS AND SEMINARS

2021 Hybridization across a tree: learning from comparative systems in swordtail fish. UC Berkeley Speciation Group seminar series.
2021 The tangled tree of life: examining the genetic consequences of hybridization. University of Basel. Zoology and Evolution seminar series.
2021 The genetic architecture of a lethal hybrid incompatibility. University of California Riverside, Department of Evolution, Ecology and Organismal Biology.

2021 The genetic architecture of two naturally occurring hybrid incompatibilities. University of Washington, Department of Genome Sciences.
2021 Unraveling the tangled web: the evolutionary impact of hybridization. University of Chicago, Department of Ecology & Evolutionary Biology.
2021 The tangled tree of life: examining the genetic consequences of hybridization. Cornell University, Department of Ecology & Evolutionary Biology.
2021 The genetic basis of a lethal incompatibility between hybridizing swordtail species. Keynote speaker: Behavior, Ecology, and Evolution of Poeciliid Fishes.
2020 The tangled tree of life: examining the genetic consequences of hybridization. Colorado State University, Biology Department Seminar.
2020 Ecological and genetic drivers of hybrid incompatibility. University of Texas at Austin, Integrative Biology Department Seminar.
2020 Genetic architecture of a naturally occurring hybrid incompatibility. Center for Evolutionary and Human Genomics Symposium, Stanford University.
2020 Genetic architecture of a naturally occurring hybrid incompatibility. Hopkins Marine Station Departmental Seminar.
2020 Ecological and genetic drivers of hybrid incompatibility. University of California at Santa Cruz, Ecology & Evolution Department Seminar.
2019 Genetic architecture of a naturally occurring hybrid incompatibility. University of California at Berkeley, Computational Biology Seminar.
2019 Unraveling the tangled web: the evolutionary impact of hybridization. University of California at Berkeley, Museum of Vertebrate Zoology Department Seminar.
2019 Genetic architecture of a naturally occurring hybrid incompatibility. University of Michigan, Department of Ecology and Evolution Seminar.
2019 Genetic architecture of a naturally occurring hybrid incompatibility. University of California at Davis, Population Biology Department Seminar.
2019 Hybridization and evolution: from genes to genomes. Instituto Gulbenkian de Ciencia Departmental Seminar, Lisbon, Portugal.
2019 The origin and evolution of a hybrid incompatibility. From mutation to speciation. Collége de France, Paris, France.
2019 Evolution of the hybrid genome: insights from swordtail fish. Biology Departmental Seminar, University of Rochester.
2019 Natural selection on hybrid genomes: insights from swordtail fish. Biology Departmental Seminar, Duke University (Graduate student selected speaker)
2019 The origin and evolution of a hybrid incompatibility. Speciation Gordon Research Conference, Ventura, California (Invited speaker - Along the speciation continuum symposium)
2019 Genome evolution in replicated hybrid zones. Ecology & Evolution Departmental Seminar, Yale University.
2019 Evolution of the hybrid genome: insights from swordtail fish. Biology Departmental Seminar, University of Maryland.
2018 Selection shapes the hybrid genome. Biology Departmental Seminar, Texas A&M University.
2018 Evolution and reproductive isolation in hybrid populations. Ecology & Evolution Departmental Seminar, Texas A&M University.
2018 The evolution of hybrid genomes and populations: insights from swordtail fish. Evolution 2018, Montpellier, France (Invited speaker – Hybridization symposium).

2018 The evolution of hybrid genomes and populations: insights from swordtail fish. Atwood Colloquium series at University of Toronto.
2017 Hybridization shapes the evolution of genomes and species: insights from swordtail fish. Dobzhansky award talk, Evolution 2017.
2017 Selection shapes hybrid genome evolution: insights from swordtail fish. Gordon Research Conference 2017.
2017 Natural selection and local recombination rates shape the genome evolution of swordtail hybrids. Biology of Genomes 2017.
2016 Hybridization shapes the contemporary evolution of swordtail fish. Biodiversity seminar series at University of British Columbia.
2016 Hybridization shapes the evolutionary history of swordtail fish. Biology department seminar at Brooklyn College.
2015 Hybridization, selection, and speciation in swordtail fish. Center for Population Biology at University of California at Davis.
2015 Hybridization, selection, and speciation in swordtail fish. Eawag aquatic research group, Lucerne, Switzerland.
2015 Reproductive isolation of hybrid populations driven by genetic incompatibilities. New York Area Population Genomics Workshop 2015.
2014 The role of hybrid incompatibilities in hybrid zone structure. Evolution 2014.
2014 High-resolution mapping reveals hundreds of genetic incompatibilities in hybridizing fish species. Biology of Genomes 2014.
2013 The genetic architecture of reproductive isolation between naturally hybridizing species. Texas A&M University.
2013 Genome-wide analysis of replicate hybrid zones between the swordtail fish *Xiphophorus birchmanni* and *X. malinche*. Evolution 2013.
2011 Comparative gene expression profiles for highly similar aggressive phenotypes in male and female cichlid fishes. Behavior 2011.

REVIEWING

Science, eLife, PLoS Genetics, Nature Ecology & Evolution, Nature Communications, Current Biology, PNAS, Evolution, Molecular Ecology, Journal of Evolutionary Biology, Trends in Ecology & Evolution

TEACHING

Biology 85 – Evolution: 2021-present. Introductory Evolution course for Stanford undergraduates.

Building Up Developing Scientists (bioBUDS): 2021-present. Graduate student led course focused on working with undergraduates to navigate their first research experiences in Biology and build skill sets necessary for research careers.

OUTREACH

Biology Preview Program: Co-organizer, 2020-present. Developed a new workshop focused on increasing representation of underrepresented groups in science in Stanford's Biology PhD program. This program invites prospective students from diverse backgrounds to participate in a

two-day workshop on navigating the application process, connecting with faculty, communicating their research, among other topics.

Aspiring Student Program: Science program instructor, 2018-2019. Developing lab-based activities for high school students and implementing them in Spanish at a language center with students from East Boston High School. These activities included dissecting owl pellets, testing herbicide resistance in wild type and round-up resistant soybeans, tracking the *Drosophila* life cycle, and culturing bacteria from swabs taken around the center.

Prison Teaching Initiative: Instructor and course leader, 2012-2016. This program offers college-level courses to prison inmates to help them earn their associate's degree while in prison. Courses taught include environmental science (four semesters, two semesters as course leader) and plant ecology and evolution (three semesters).

Teach for America: 6th grade science teacher in Clarksdale, MS, 2009-2011.