

Molly Schumer

HHMI & Harvard Society of Fellows
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POSITIONS

Hanna H. Gray Fellow - HHMI, 9/2017 - present
Junior Fellow - Harvard Society of Fellows, Harvard University, 7/2016 - present
Postdoctoral researcher, Columbia University, 2/2016 -12/2016
Adviser: Molly Przeworski

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
Title: Hybridization and speciation in swordtail fish
Advisers: Peter Andolfatto and Gil Rosenthal

AWARDS AND GRANTS

2017 Theodosius Dobzhansky Prize
2017 L'Oréal USA for Women in Science Fellow
2017 Hanna H. Gray Fellow
2017 Harvard University Milton Fund Awardee
2016 NSF Postdoctoral Research Fellowship in Biology (*declined*)
2015 Helen Hay Whitney Postdoctoral Fellowship (*declined*)
2014-2016 National Science Foundation Doctoral Dissertation Improvement Grant
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
2009-2011 Significant classroom gains, Teach for America
2009 Society for Integrative and Comparative Biology, Best Student Poster
2008 Reed College Opportunity Grant Recipient
2008-2009 Reed College Biology Undergraduate Research Program Grant
2007 James F. and Marion L. Miller Foundation Research Award Recipient
2007 James F. and Marion L. Miller Foundation Summer Award Recipient
2007 Goldwater Scholarship

RESEARCH INTERESTS

Hybridization and speciation
Population genomics
Sexual selection and behavior
Genetic architecture of traits under selection

PUBLICATIONS

21. **Schumer, M.**, Xu, C., Powell, D., Holland, D., Rosenthal, G.G.R., Andolfatto, P., Przeworski, M. Natural selection and local recombination rates shape the genome evolution of swordtail hybrids. *In preparation*.
20. **Schumer, M.**, Rosenthal, G.G.R., Andolfatto, P. What do we mean when we talk about hybrid speciation? *In revision*.
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*. *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*.
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

- 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.

TEACHING AND MENTORING

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).

Student advising:

- Nikki Chu, Princeton 2013: Mate preference and hybridization in *Xiphophorus hellerii* and *maculatus*
- Loren Castellon, Princeton 2014: Gene expression of candidate genes underlying a sexually selected melanotic phenotype in *Xiphophorus*
- Rebecca Dresner, Princeton 2014: Identifying potential hybrid incompatibilities using linkage disequilibrium in hybrid *Xiphophorus* populations
- Megan Abbott, Princeton 2016: Historical changes in population structure and assortative mating in hybrid *Xiphophorus* populations
- Yuki Haba, Columbia 2016: PRDM9 evolution and diversity in vertebrates

Assistant in Instruction: Teaching Assistant for Princeton's undergraduate evolution course: EEB 209, 2011-2012; 2012-2013.

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

REVIEWING

Evolution, Molecular Ecology, PLoS Genetics, eLife, Journal of Evolutionary Biology, Nature Ecology & Evolution