

Erin S. Kelleher

Department of Biology and Biochemistry • University of Houston
421C Science and Research 2 • Houston, TX 77204
Phone: 713 743 3640 • Fax: 713-743-2636 • E-Mail: eskelleh@central.uh.edu

Professional Appointments

- Associate Chair for Graduate Affairs, Biology and Biochemistry, University of Houston 2021-Present
- Associate Professor of Biology and Biochemistry, University of Houston 2019-Present
- Assistant Professor of Biology and Biochemistry, University of Houston 2013-2019

Education

- Ph.D. Ecology and Evolutionary Biology, University of Arizona 2009
- B.S. Biology, University of Virginia 2003
- B.A. Archaeology, University of Virginia 2003

Training

- Post-Doctoral Fellow, Daniel Barbash Lab, Cornell University 2009-2013
Evolution of TE regulation in the Drosophila melanogaster germline
- Ph.D. Student, Therese Markow Lab, University of Arizona 2004-2009
Evolution of reproduction tract interactions in cactophilic Drosophila
- Visiting Ph.D. Student, Thomas Kaufman Lab, Indiana University Spring 2008
Transgenic approaches in non-model Drosophila
- Faculty Research Assistant, Gerald Wilkinson Lab, University of Maryland – College Park 2003-2004
Sexual selection and meiotic drive in stalk-eyed flies

Fellowships

- National Institute of Health – National Research Service Award Post-Doctoral Fellowship 2010-2013
- Cornell Center for Comparative and Population Genomics – Post-Doctoral Fellow 2009-2010
- American Dissertation Fellowship – American Association of University Women 2008-2009
- National Science Foundation - IGERT Fellow in Functional, Evolutionary and Computational Genomics at the University of Arizona 2004-2008

Research Grants

- PI: NIH-NIGMS ESI-R35 “MIRA: Mechanisms and Evolution of Host Tolerance to Transposable Elements”. Impact Score:32. Total Funding: \$1,778,878 2020-present
- PI: NSF-MCB 2003395 “Mechanisms and Evolution of Transposon Tolerance in *Drosophila*” Total Funding: \$963,679 *Declined to accept funding*
- PI: NSF-DEB1457800 “Disentangling the roles of mutation and selection in the evolution of host-repression of transposable elements.” Total Funding: \$721,094. (*currently in no-cost extension*) 2015-present
- Graduate Research Fellowship – University of Arizona Center for Insect Science 2008
- Eloise Gerry Fellowship – Sigma Delta Epsilon – Graduate Women in Science 2007
- Doctoral Dissertation Improvement Grant – National Science Foundation 2007

Awards/Honors

- Travel Award – Society for Molecular Biology and Evolution 2009, 2010
- Chapman Memorial Prize in Insect Science – University of Arizona 2008
- Galileo Circle Scholar – University of Arizona 2007
- Travel Award – Society for the Study of Evolution 2007
- Travel Award – Graduate Women in Science – University of Arizona 2007
- Travel Award – Graduate and Professional Student Council – University of Arizona 2006
- Best Poster – BIO5 *Drosophila* Research Symposium – University of Arizona 2006

Publications

- **Kelleher, E.S.*** (2021) Protein-Protein Interactions Shape Genomic Autoimmunity in the Adaptively-Evolving Rhino-Deadlock-Cutoff (RDC) Complex. *Genome Biology and Evolution.*, 13:evab132.
- Wang L.§, Barbash D.A., **Kelleher E.S.*** (2020) Adaptive evolution among cytoplasmic piRNA proteins leads to decreased genomic auto-immunity. *PLoS Genetics*, 16: e1008861.
- **Kelleher E.S.***, Barbash D.A., and Blumenstiel J.P. (2020). Taming the Turmoil Within: New Insights on the Containment of Transposable Elements. *Trends in Genetics*, 36:474–489.

- Zhang S.§, Pointer B, and **Kelleher E.S.*** (2020) Rapid evolution of piRNA-mediated silencing of an invading transposable element was driven by abundant de novo mutations. *Genome Research*, 30:566-575.
- **Kelleher E.S.***, Lama J.§, Wang L.§ (2020) Uninvited guests: how transposable elements take advantage of *Drosophila* germline stem cells, and how stem cells fight back. *Current Opinion in Insect Science*. 37:49-56.
- **Kelleher E.S.***, Jaweria J.†, Akoma U.†, Ortega L. †, Tang W. † (2018) QTL mapping of natural variation reveals that the developmental regulator *bruno* reduces tolerance to *P*-element transposition in the *Drosophila* female germline. *PLoS Biology*. 16:e2006040.‡
- **Kelleher E.S.***, Azevedo R.B.R., Zheng Y.§. (2018) The Evolution Of Small RNA-Mediated Silencing Of An Invading Transposable Element. *Genome Biology and Evolution*. 10:3038-3057.
- Tasnim S. †, **Kelleher E.S.*** (2018) *p53* is required for female germline stem cell maintenance in *P*-element hybrid dysgenesis. *Developmental Biology*. 434:215-220.
- **Kelleher E.S.*** (2017) Retrotransposons: Stowaways in the Primordial Germline. *Curr Biol*. 27:R1066-R1068. doi:10.1016/j.cub.2017.08.059.
- Zhang S.§, **Kelleher E.S.*** (2017) Targeted identification of TE insertions in a *Drosophila* genome through hemi-specific PCR. *Mob DNA*. 8:10.
- Srivastav S.P. †, **Kelleher E.S.*** (2017) Paternal induction of hybrid dysgenesis in *Drosophila melanogaster* is weakly correlated with both *P*-element and hobo element dosage. *G3*. 7: 1487-1497.
- **Kelleher E.S.*** (2016) Re-examining the Classic *P*-element Invasion of *Drosophila melanogaster* through the Lens of piRNA-Mediated Silencing. *Genetics*. 203:1513-1531.
- **Kelleher, E.S.***, Barbash D.A.* (2013) Analysis of piRNA-mediated silencing of active TEs in *Drosophila melanogaster* suggests limits on the evolution of host genome defense. *Molecular Biology and Evolution*. 30:1816-1829.
- **Kelleher, E.S.***, Edelman, N.B., Barbash, D.A.* (2012) *Drosophila* interspecific hybrids phenocopy piRNA pathway mutants. *PLoS Biology*. 10:e1001428.
- Bono, J.M., Matzkin, L.M., **Kelleher, E.S.**, Markow T.A.* (2011) Post-mating transcriptional changes in the reproductive tracts of con- and heterospecifically mated *Drosophila mojavensis* females. *Proc. Nat. Acad. Sci. U.S.A.* 108:7878-7883.
- **Kelleher, E.S.***, Clark, N.L., Markow, T.A. (2011) Female Reproductive Protease Evolution Suggests Sexual Conflict in Geographically Isolated Races of *Drosophila mojavensis*. *Genetics*. 187:865-876.
- **Kelleher, E.S.***, Barbash, D.A.* (2010) Expanding Islands of Speciation. *Nature* 465:1019-1020.
- **Kelleher, E.S.***, Pennington, J. E. (2009) Protease gene duplication and proteolytic activity in *Drosophila* female reproductive tracts. *Molecular Biology and Evolution*. 26:2125-2134.

* Denotes corresponding author

† Denotes undergraduate trainee

‡ This paper was selected for a *PloS Biology* Primer: <https://doi.org/10.1371/journal.pbio.3000036>

§ Denotes graduate trainee

- **Kelleher, E.S.** *, Watts, T.D., LaFlamme, B.A., Haynes, P.D., and Markow, T.A. (2009) Proteomic analysis of *Drosophila mojavensis* male accessory glands suggests novel classes of seminal fluid proteins. *Journal of Insect Biochemistry and Molecular Biology*. 39:366-371.
- **Kelleher, E.S.** *, Markow, T.A. (2009) Duplication, Selection, and Gene Conversion in a *Drosophila mojavensis* Female Reproductive Protein Family. *Genetics*. 181:1451-65.
- **Kelleher, E.S.** *, Swanson, W.J., Markow, T.A. (2007) Gene Duplication and Adaptive Evolution of Digestive Proteases in *Drosophila arizonae* Female Reproductive Tracts. *PLoS Genetics*. 3:e138.
- **Kelleher, E.S.**, Markow, T.A. * (2007). Reproductive Tract Interactions Contribute to Isolation in *Drosophila*. *Fly*. 1:33-37.
- Markow, T.A. *, Reed, L.K., **Kelleher, E.S.** (2006) Sperm fate and function in reproductive isolation in *Drosophila*. In: Roldan, E.S, and Gomiendo, M. Eds. Spermatology. Nottingham University Press, Nottingham.
- Wilkinson, G.S. *, Johns, P.M., **Kelleher, E.S.**, Muscedere, M., Lorsong, A. (2006) Fitness effects of X-chromosome drive in the stalk-eyed fly *Cyrtodiopsis dalmanni*. *Journal of Evolutionary Biology*. 19:1851-1860.

Preprints

- Lama, J. §, Srivastav, S. †, Tasnim, S., †, Hubbard, D. A. †, and **Kelleher, E.S.*** Natural tolerance to transposition is associated with Myc-regulation and DNA repair.
<https://www.biorxiv.org/content/10.1101/2020.11.12.380154v1>

Invited Talks

- The University of Montana, Missoula, MT, United States 2021
- The University of Georgia, Athens, GA, United States 2021
- The Pennsylvania State University, State College, PA, United States 2018
- *Genomics of Conflict Symposium*, University of Minnesota, St. Paul, MN, United States 2017
- *Gordon Research Conference in Fertilization and Development*. Holderness, NH, United States. 2017
- The Vienna Institute for Population Genetics, Vienna, Austria 2017
- University of Texas –Tyler. Tyler, TX, United States 2016
- University of Texas – Arlington. Arlington, TX, United States 2016
- M.D. Anderson Cancer Center, Houston, TX, United States 2015
- Texas A&M, College Station, TX, United States 2015
- Rice University, Houston, TX, United States 2014
- *Deep Genomics Symposium*, The University of Arizona, Tucson, AZ 2014
- Emory University, Atlanta, GA, United States 2013
- University of Houston, Houston, TX, United States 2013
- University of Connecticut, Storrs, CT, United States 2013
- Colorado State University, Fort Collins, CO, United States 2013

- Wright State University, Dayton, OH, United States 2013
- Binghamton University, Binghamton, NY, United States 2013
- Western Michigan University, Kalamazoo, MI, United States 2013
- University of Alabama, Tuscaloosa, AL, United States 2013
- University of Idaho, Moscow, ID, United States 2013

Contributed Talks at International Conferences

- Lama, J., and **Kelleher E.S.** (2021). Natural tolerance to transposition is associated with increased expression of DNA repair machinery. *62nd Annual Drosophila Research Conference. Virtual.*
- Wang L.§, Barbash D.A., **Kelleher E.S.** (2019). Adaptive evolution of piRNA pathway proteins affects piRNA biogenesis but not TE transcripts. *60th Annual Drosophila Research Conference. Dallas, TX, USA*
- Zhang S.§, **Kelleher, E.S.** (2018) piRNA-mediated silencing of an invading TE evolves rapidly through abundant beneficial *de novo* mutations. *Genetics Society of America's Population Evolutionary and Quantitative Genetics Conference, Madison, WI, United States*
- **Kelleher, E.S.**, Azevedo, R., Zheng, Y.§ (2016) The evolution of small RNA-mediated silencing of an invading transposable element. *Annual Conference of the Society for the Study of Evolution. Austin, TX, United States.*
- **Kelleher, E.S.**, Barbash, D.A. (2012) Aberrant piRNA production and global TE derepression in *Drosophila* interspecific hybrids suggest that rapidly evolving piRNA proteins contribute to genome defense. *Annual Meeting of the Society for Molecular Biology and Evolution. Dublin, Ireland*
- **Kelleher, E.S.**, Barbash, D.A. (2012) *Drosophila* interspecific hybrids phenocopy piRNA pathway mutants in aberrant piRNA production and TE derepression. *Genomic Impact of Eukaryotic Transposable Elements. Asilomar, CA, United States*
- **Kelleher, E.S.**, Barbash, D.A. (2011) Complex evolutionary changes in germline TE regulation revealed by *Drosophila* interspecific hybrids. *52nd Annual Drosophila Research Conference. San Diego, CA, United States*
- **Kelleher, E.S.**, Barbash, D.A. (2011) Adaptive evolution of piRNA proteins is associated with pathway dysfunction and TE derepression in *Drosophila* interspecific hybrids. *Annual Meeting of the Society for the Study of Evolution. Norman, OK, United States*
- **Kelleher, E.S.**, Barbash D.A. (2010) Complex evolutionary changes in germline TE regulation revealed by *Drosophila* interspecific hybrids. *Annual Meeting of the Society for Molecular Biology and Evolution. Lyon, France*
- **Kelleher, E.S.**, Markow, T.A. (2009) Duplication, selection, and gene conversion in *D. mojavensis* Female Reproductive Tract Proteins. *Annual Meeting of the Society for Molecular Biology and Evolution. Iowa City, Iowa*
- **Kelleher, E.S.**, Markow, T.A. (2007) Adaptive radiation of digestive proteases in *Drosophila* female reproductive tracts. *Annual Meeting of the Society for the Study of Evolution. Christchurch, New Zealand*

Contributed Posters at International Conferences

- Lama, J. §, Srivastav, S. †, Tasnim, S. †, Hubbard, D. † and **Kelleher, E.S** (2020) Natural tolerance to transposition is associated with increased expression of DNA repair machinery. *6nd Annual Drosophila Research Conference. Virtual.*
- Saiz., L and **Kelleher, E.S** (2020) *bruno* and *P*-element transposition: positive regulator of cellular responder. *The Allied Genetics Conference. Virtual.*
- Lama, J. §, Srivastav, S. †, Tasnim, S. †, Hubbard, D. † and **Kelleher, E.S** (2020) Centromeric determinants of host tolerance to transposable elements. *The Allied Genetics Conference. Virtual.*
- Wang, L. §, **Kelleher, E.S.** (2020) Host response to an invading TE: extinction vs. repression. *The Allied Genetics Conference. Virtual.*
- Zhang S.§, **Kelleher, E.S.** (2019) piRNA-mediated silencing of an invading TE evolves rapidly through abundant beneficial *de novo* mutations. *60th Annual Drosophila Research Conference. Dallas, TX, USA*
- Lama, J. §, **Kelleher, E.S.** (2019) Satellite Repeats are Associated with Host Tolerance of an Active TE. *60th Annual Drosophila Research Conference. Dallas, TX, USA*
- **Kelleher, E.S.**, Jaweria, J. †, Akoma, U. †, Ortega, L. †, Tang, W. † (2018) Putting up with parasites: a developmental regulator confers tolerance of transposition in the *Drosophila* female germline. *Genetics Society of America's Population Evolutionary and Quantitative Genetics Conference, Madison, WI, United States*
- Lama, J. §, **Kelleher, E.S.** (2018) Satellite Repeats are Associated with Host Tolerance of an Active TE. *59th Annual Drosophila Research Conference , Philadelphia, PA, United States*
- Wang, L. §, Barbash, D.A., **Kelleher, E.S.** (2018) Functional divergence among adaptively evolving TE regulators in *Drosophila*. *59th Annual Drosophila Research Conference , Philadelphia, PA, United States*
- **Kelleher, E.S.**, Jaweria, J. †, Akoma, U. †, Ortega, L. †, Tang, W. † (2018) Putting up with parasites: a developmental regulator confers tolerance of transposition in the *Drosophila* female germline. *59th Annual Drosophila Research Conference , Philadelphia, PA, United States*
- **Kelleher, E.S.** (2017) Genetic Variation in Host Tolerance of an Invading Transposable Element. *Annual Conference of the Society for Molecular Biology and Evolution. Austin, TX, United States.*
- Zhang, S. §, **Kelleher, E.S.** (2017) Polymorphism in *P*-element repressor alleles. *Annual Conference of the Society for Molecular Biology and Evolution. Austin, TX, United States.*
- Zhang, S. §, **Kelleher, E.S.** (2016) A targeted resequencing approach facilitates annotation of polymorphic TE insertions in *Drosophila* genomes. *Annual Conference of the Society for the Study of Evolution. Austin, TX, United States.*
- Zheng, Y, Azevedo, R, **Kelleher, E.S.** (2015) *P*-element invasion and the evolution of host repression. *56th Annual Drosophila Research Conference, Chicago, IL, United States.*
- **Kelleher, E.S.**, Barbash, D.A. (2013) Lack of association between piRNA abundance and the deleterious capacity of transposable element families in *Drosophila melanogaster*. *54th Annual Drosophila Research Conference, Washington, DC, United States*

- **Kelleher, E.S.**, Barbash, D.A. (2010) Examination of piRNA pathway evolution using *D. melanogaster* and *D. simulans* interspecific hybrids. *51st Annual Drosophila Research Conference, Washington, DC, United States*
- **Kelleher, E.S.**, Markow, T.A. (2008) Evolution of a female reproductive protease gene family in cactophilic *Drosophila*. *49th Annual Drosophila Research Conference. San Diego, CA, United States*
- **Kelleher E.S.**, Markow, T.A. (2007) Adaptive radiation of digestive proteases in *Drosophila* female reproductive tracts. *48th Annual Drosophila Research Conference. Philadelphia, PA, United States*
- **Kelleher E.S.**, Markow, T.A. (2006) Post-copulatory pre-zygotic reproductive isolation in cactophilic *Drosophila*. *Annual Drosophila Research Conference. Houston, TX, United States*
- **Kelleher E.S.**, Markow, T.A. (2005) Reproductive tract interactions in female *Drosophila*. *Annual meeting of the Society for the Study of Evolution. Fairbanks, AK, United States*

Teaching Experience

- Scientific Oral Presentation, Instructor, University of Houston Fall 2018
- Modern Genetic Approaches, Instructor, University of Houston Spring 2018
- Graduate Biostatistics, Instructor, University of Houston Fall 2016,2019,2021
- Genetics, Co-instructor, University of Houston Spring 2014–2017,2019,2020
- The Biology of Food, Guest Lecturer, University of Houston Fall 2017
- EcoDevo, Guest Lecturer, University of Houston Fall 2015
- Biochemistry, Guest Lecturer, Ithaca College Spring 2011
- Biology of Sex, Guest Lecturer, Cornell University Spring 2011
- Genetics, Teaching Assistant, University of Arizona Fall 2005, Spring 2007
- Human Genetics and Evolution, Teaching Assistant/Guest Lecturer Spring 2006

Graduate Trainees

- Shuo Zhang (Ph.D. 2019). Ph.D. thesis title: “Evolution of piRNA-mediated repression of *P*-elements in North American *Drosophila melanogaster*”
- Luyang Wang (Ph.D. 2020). Ph.D. thesis title: “Functional divergence in adaptively evolving piRNA effector proteins”
- Jyoti Lama (Ph.D. 2021). Ph.D. thesis title: “The role of pericentromeric heterochromatin in host tolerance to an invading TE”
- Farnaz Naemeekia (2019–2020). M.S.
- Lorissa Saiz (2021–present) Ph.D. Student
- Modupeola Bolaji (2021–present) Ph.D. Student
- Jae-Hake Son, Rotation Student, Fall 2014
- Joe Reeves, Rotation Student, Fall 2016
- Kiran Adhikari, Rotation Student, Spring 2017
- Rahul Neupane, Rotation Student, Spring 2017
- Scott Widmann, Rotation Student, Spring 2018

- Shafaat Hossain, Rotation Student, Fall 2021
- Mariajose Tarot, Rotation Student, Fall 2022

Undergraduate Trainees

- Satyam Srivastav (2014–2015, currently a Ph.D. Student at Cornell). Honor’s thesis title: “Investigating the role of TE copy number in its piRNA-mediated regulation by the host genome”
- Hawraa Rasool (2014, currently an early childhood educator). Provost’s Undergraduate Research Fellow 2014.
- Sadia Tasnim (2015–2016, currently a medical student at University of Texas – Medical Branch). Summer Undergraduate Research Fellow 2015.
- Uche Akoma (2015–2017, currently a technician at Baylor College of Medicine). Provost’s Undergraduate Research Fellow 2016.
- Efren Silva (2019–Present). Summer Undergraduate Research Fellow 2019.
- 18 additional UH undergraduates were trained in *Drosophila* genetics and molecular biology. Many of these students are co-authors on manuscripts in review or in preparation. Many of those that have graduated have gone on to medical school, dental school, or are working in a STEM related field.

Professional Service

- Editor – *PloS Biology* 2021–present
- Organizer – *Southeast Texas Evolutionary Genetics and Genomics Symposium* 2016
- Co-Chair – *Evolution and Quantitative Genetics Session, Drosophila Research Conference* 2015,2019
- Panelist – *National Science Foundation – Division of Environmental Biology* 2015
- Ad Hoc Reviewer – *Sigma Delta Epsilon – Graduate Women in Science, University of Missouri Research Board, National Science Foundation* 2014–present
- Peer Reviewer – *BMC Genomics, BMC Research Notes, Current Biology, Genome Biology and Evolution, eLife, Genes, Genetics, G3, International Journal of Evolutionary Biology, Journal of Experimental Biology, Journal of Heredity, Journal of Molecular Evolution, Mobile DNA, Molecular Biology and Evolution, Molecular Ecology Resources, Proceedings of the Royal Society B: Biological Sciences, PLoS Biology, PloS Genetics, PloS One* 2007–present

Departmental Service

- Diversity, Equity and Inclusion Committee 2020–present

- Computational Biology Faculty Search Committee 2020
- Graduate Advising and Recruiting Committee 2017-2021
- *Drosophila* Kitchen Manager 2017-2021
- *Drosophila* Kitchen Co-Manager
- Mathematical Biology Faculty Search Committee 2017
- Website redesign committee 2016
- Comprehensive exam redesign committee 2014

Affiliations/Memberships

- Genetics Society of America
- Society for the Study of Evolution
- Society for Molecular Biology and Evolution

Outreach

- Research Experience for Teachers (RET) Sponsor (NSF) 2016,2017,2019
- Developer and Co-instructor of the *Drosophila* Genetics Workshop for 7th Grade Science Teachers at the University of Houston 2015, 2016, 2017,2019
- 7th Grade Science Fair Judge, Galena Park Middle School, Galena Park, TX 2014
- Mentor, Undergraduate Diversity Program, Society for Molecular Biology and Evolution 2010, 2012
- Workshop Leader, Expanding Your Horizons Program, University of Arizona, Cornell University 2007, 2010, 2011
- Guest Speaker, I.B. Biology Program. J.E.B. Stuart High School, Falls Church, VA Spring 2009
- Leadership Council, Women in Science and Engineering (WISE), University of Arizona 2006-2008
- Undergraduate Mentor, Women In Science and Engineering (WISE), University of Arizona 2007-2008
- Middle School Science Project Mentor, GEAR UP, Tucson, AZ 2007
- Mentor, Undergraduate Diversity Program, Society for the Study of Evolution 2005