

Mia T. Levine, PhD

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Education

PhD	Molecular Population Genetics, University of California, Davis	2009
MSc	Ecology and Evolution, University of Illinois, Champaign	2003
BA	Biology <i>with honors</i> , University of Pennsylvania, <i>magna cum laude</i>	1999

Professional Experience

Member, Penn Center for Genome Integrity, Philadelphia, PA	2019-
Core Faculty Member, Penn Epigenetics Institute, Philadelphia, PA	2015-
Assistant Professor of Biology, Univ. of Pennsylvania, Philadelphia, PA	2015-
Postdoctoral Fellow, Fred Hutchinson Cancer Research Center, Seattle, WA Advisor: Harmit Malik (<i>Evolutionary cell biology</i>) <i>Causes and functional consequences of chromatin protein evolution</i>	2009-15

Awards and Fellowships

Penn Biology Department Undergraduate Teaching Award	2020
SMBE Allan Wilson Junior Award for Independent Research	2017
Forbeck Scholar Award, William Guy Forbeck Research Foundation	2016-20
NIH K99 Pathway to Independence Award	2013-15
NIH Ruth L. Kirschstein NRSA Postdoctoral Fellowship	2011-13
Genetics Society of America DeLill Nasser Award	2010
Dissertation Year Fellowship, University of California, Davis	2008-09
NSF Pre-doctoral Graduate Research Fellowship	2003-06

Current External Funding

GM124684-01 NIH/NIGMS R35 Maximizing Individual Researchers' Award for Early Stage Investigators 09/17- 07/22

“Causes and functional consequences of chromatin evolution”

Role: PI

R21 HD102801-02 NIH/NICHD R21 07/20-07/22

“Evolutionary innovation to preserve zygotic genome integrity”

Role: PI (dual-PI grant with Michael Lampson)

Current Intramural Funding

Seed grant, Penn Center for Genome Integrity, University of Pennsylvania 02/20-

“Causes and consequences of TRF2 evolution in primates”

Role: PI

Completed Funding

University Research Fund, University of Pennsylvania 05/19-03/20

“Epigenetic regulation of reproductive arrest”

Role: PI

1KR00GM107351 NIH/NIGMS R00 07/15-06/18

“Evolutionary and functional diversification of chromatin proteins”

Role: PI

DEB0806205 NSF/DEB Dissertation Improvement Grant 07/08-06/09

“Functional consequences of adaptive variation at chromatin remodeling genes”

Role: co-PI

Publications – Primary Research

Kumon T., Ma, J., Stefanik, D., Nordgren, E., Akins, R.B., Kim, J., **Levine, M.T.**, and M.A. Lampson (*in revision*). Centromere drive and suppression by parallel pathways for recruiting microtubule destabilizers.

<https://www.biorxiv.org/content/10.1101/2020.11.26.400515v1>

Saint-Leandre, B., Christopher, C., and **M.T. Levine** (2020) Adaptive evolution of an essential telomere protein restricts telomeric retrotransposons. *eLife* 9:e60987.

- **Additional coverage:** Castillo-Gonzalez and Shippen (2020) Telomeres: Change and HOAP for the best. *eLife* 9: e64945.

Saint-Leandre, B., Nguyen, SB., and **M.T. Levine** (2019) Diversification and collapse of a telomere elongation mechanism. *Genome Research*. 29: 920-931.

Helleu, Q. and **M.T. Levine** (2018) Recurrent amplification of the Heterochromatin Protein 1 (HP1) gene family across Diptera. *Molecular Biology and Evolution*. **35**: 2375-2389.

Lee, Y.C.G., Leek, C., and **M. T. Levine** (2017) Recurrent innovation at genes required for telomere integrity in *Drosophila*. *Molecular Biology and Evolution*. **34**: 467-482

Publications – Reviews/Previews

Brand C.L. and **M.T. Levine** (*under review at Annual Review of Genetics*) Functional diversification of chromatin on rapid evolutionary timescales.

Saint-Leandre, B. and **M.T. Levine** (2020) The Telomere Paradox: Stable genome preservation with rapidly evolving proteins. *Trends in Genetics*. 36: 232-242.

Drinnenberg et al. (2019) EvoChromo: Towards a synthesis of chromatin biology and evolution. *Chromatin and Epigenetics* 146: dev178962.

Lee, Y.C.G. and **M.T. Levine** (2017) Germline genome protection on an evolutionary treadmill. *Developmental Cell*: **43(1)**: 1-3.

- Preview for: Parhard S. *et al.* (2017) Adaptive evolution leads to cross-species incompatibility in the piRNA transposon silencing machinery *Developmental Cell*: **43**:60-70.

Publications prior to arrival at Penn (*reviews and previews designated with €*)

Levine, M.T., Vander Wende, H., Hseih, E., Baker E., and H.S. Malik (2016) Recurrent gene duplication diversifies genome defense repertoire in *Drosophila*. *Molecular Biology and Evolution*. **33**:1641-53.

Levine, M.T., Vander Wende, H., and H.S. Malik (2015) Mitotic fidelity requires transgenerational action of a testis-restricted HP1. *eLife* **4**: e07378.

Additional coverage:

“Biparental control in remodeling sperm” *Science* 7 August 2015: Vol. 349 no. 6248 p. 599

“Transgenerational remodeling of sperm DNA” *Nature Reviews Molecular Cell Biology* 23 July 2015 Vol. 16, no. 453

“Reprogramming sperm DNA” (Interview) The Naked Scientist eLife podcast, 27 July 2015

€ **Levine, M.T.** and H.S. Malik (2013) A rapidly evolving genomic toolkit of *Drosophila* heterochromatin. *Fly* **7**: 137-141.

Levine, M.T., McCoy, C. Vermaak. D., Lee Y.C.G, Hiatt, M.A., Matsen, F.A., and H.S. Malik (2012) Phylogenomic analysis reveals dynamic evolutionary history of the *Drosophila* Heterochromatin Protein 1 (HP1) gene family. *PLoS Genetics* **8**(6): e1002729.

Moyle, L.C., **Levine, M.T.**, Stanton, M.L. and J.W. Wright (2012) Hybrid sterility over tens of meters between ecotypes adapted to serpentine and non-serpentine soils. *Evolutionary Biology* **39**: 207-218.

€ **Levine, M.T.** and H.S. Malik (2011) Learning to protect your genome on the fly. *Cell* **147**: 1440-1441.

- Preview for: Khurana, J.S. *et al.* (2011) Adaptation to transposon invasion in *Drosophila melanogaster*. *Cell* **147**:1551-1563.

Levine, M.T., Eckert, M., and D.J. Begun (2011) Whole genome expression plasticity across tropical and temperate *Drosophila melanogaster* populations from eastern Australia. *Molecular Biology and Evolution* **28**: 249–256.

Levine, M.T. and D.J. Begun (2008) Evidence of spatially varying selection at four chromatin-remodeling loci in *Drosophila melanogaster*. *Genetics* **179**: 455-473.

Turner, L.T., **Levine, M.T.**, and D.J. Begun (2008) Genomic analysis of adaptive differentiation in *Drosophila melanogaster*. *Genetics* **179**: 475-485.

Levine, M.T., Holloway, A.K., Arshad, U., and D.J. Begun (2007) Pervasive and largely lineage-specific adaptive protein evolution in the dosage compensation complex of *Drosophila melanogaster*. *Genetics* **177**: 1959–1962.

Levine, M.T. and D.J. Begun (2007) Comparative population genetics of the immunity gene, *relish*: Is adaptive evolution idiosyncratic? *PLoS ONE* **2**(5): e442.

Levine, M.T., C.D. Jones, A.D. Kern, H.A. Lindfors, and D.J. Begun (2006) Novel genes derived from noncoding DNA in *Drosophila melanogaster* are frequently X-linked and exhibit testis-biased expression. *Proceedings of the National Academy of Sciences USA* **103**: 9935-9939.

Invited Talks

EMBL Mobile Genome Conference, Heidelberg, Germany	2021
Stowers Institute Research Conference on Repetitive DNA	2021
Carnegie Institution, Department of Embryology	2021
Vanderbilt University, Biological Sciences Department	2021
Rutgers University-Camden, Ctr of Computational and Integrative Biology	2020

Max Planck Institute for Evolutionary Biology, Ploen, Germany	2020
*postponed due to COVID	
National Taiwan University, Genome and Systems Biology Program	2019
Columbia University, Evolution Supergroup	2019
New York Academy of Science, Genome Integrity Group	2019
University of Rochester, Department of Biology	2019
Society for Molecular Biology and Evolution Conference	2019
Stowers Institute, Kansas City	2019
University of Kansas, Department of Molecular Biosciences	2019
University of Chicago, Committee on Genetics, Genomics & Systems Biology	2019
* <i>Graduate student invited speaker</i>	
Institut für Populationsgenetik, Veterinärmedizinische, University of Vienna	2018
Epigenetics Institute Retreat, University of Pennsylvania	2018
Company of Biologists Workshop, Sussex, UK	2018
University of Nebraska, School of Biological Sciences	2018
University of Utah, Department of Human Genetics	2018
* <i>Graduate student invited speaker</i>	
Temple University, Department of Biology	2018
Lehigh University, Department of Biology	2017
Perelman School of Medicine, U of Pennsylvania, Department of Genetics	2017
Bryn Mawr College, Department of Biology	2016
William Guy Forbeck Foundation Annual Forum on Aneuploidy and Genome Instability	2016
Villanova University, Department of Biology	2016
University of Pennsylvania, Epigenetics of Cell Fate Symposium	2016

University Teaching

2021

Co-instructor: BIOL 221 *Molecular Biology and Genetics*

2020

Co-instructor: BIOL 221 *Molecular Biology and Genetics*

Instructor: BIOL433 *Genetics of Adaptation: How sex, pathogens, and the environment shape modern genomes*

Guest Lecturer: BIOL 540 Genetic Analysis

2019

Co-instructor: BIOL 221 *Molecular Biology and Genetics*

Instructor: BIOL433 *Genetics of Adaptation: How sex, pathogens, and the environment shape modern genomes*

Guest Lecturer: BIOL 483 Epigenetics

2018

Instructor: BIOL 221 *Molecular Biology and Genetics*

Guest Lecturer: BIOL 483 Epigenetics

2017

Instructor: BIOL433 *Genetics of Adaptation: How sex, pathogens, and the environment shape modern genomes*

Guest Lecturer: BIOL 483 Epigenetics

Guest Lecturer: BIOL 410 Advanced Evolution

2016

Guest Lecturer: BIOL 540 Advanced Topics in Genetics

Academic Service

Community

Session Chair, Molecular Mechanisms of Evolution, Gordon Research Conference *postponed due to COVID	2021
<i>eLife</i> , Reviewing Board of Editors	2019-
Walter Fitch Award/Student Travel Award Committee Member, Society for Molecular Biology and Evolution	2018
Drosophila Image Award Committee Member, Genetics Society of America	2017-
Epigenetics and Chromatin Session Chair, Drosophila Research Conference	2017
National Science Foundation Grant Review Panelist, ad hoc Reviewer	2014-
Reviewer— <i>eLife</i> , <i>Current Biology</i> , <i>PLoS Genetics</i> , <i>Proceedings of the National Academy of Sciences</i> , <i>Genetics</i> , <i>Molecular Cell</i> , <i>Molecular Biology and Evolution</i> , <i>Heredity</i> , <i>Proc. Roy. Soc</i> , <i>BMC Genomics</i> , <i>Genome Biology and Evolution</i> , <i>NY Academy of Sci</i> , <i>Bioessays</i> , <i>Journal of Molecular Biology</i> , <i>Nucleic Acids Research</i> , <i>Molecular Ecology</i> , <i>Chromatin and Epigenetics</i>	

Biology Department

Biology Department Curriculum Committee	2021-
Graduate Student Advising Committee	2019-
Intro to Biology Dept. Research Presentation in BIOL102	2019
Faculty advisor for majors	2019
<ul style="list-style-type: none">• Liam Forsythe (C'21)• Valentina Rodriguez (C'21)• Vincent Paik (C'22)• Lealem Aderie (C'22)• Ryan Hood (C'22)	
Meet-A-Professor information session for biology majors	2018
Biology Seminar Series, Committee Chair	2017-20
Animal Behavior Search Committee Member	2017
Biology majors information session speaker	2017
Graduate Group Recruitment Planning Committee Chair	2016-
Biology Graduate Group Recruitment Visit Seminar Speaker	2016-
Computational Biology Curriculum Committee	2016-
Biology Retreat Poster Judge	2016
Biology Graduate Group Orientation Seminar Speaker	2016

Center for Teaching and Learning, Panel Member

2015

Graduate Student Committees

(BGG = Biology Graduate Group, G&E = Genetics and Epigenetics, Perelman School of Medicine)

Dissertation Committee Member, Dajia Ye, Biology	2021
Dissertation Committee Member, Edgar Monteiro, Biology	2020
Dissertation Committee Member, Linyang, Ju, BGG	2019-
Dissertation Committee Member, Yonguin Li, BGG	2019-
Dissertation Committee Member, Randi Isenhardt, G&E	2019-
Dissertation Committee Member, Ozan Kiratli, BGG	2017-
Dissertation Committee Member, Jennifer Aleman, G&E	2017-
Dissertation Committee Member, Tomohiro Kumon, BGG	2017-
Dissertation Committee Member, Riley Graham, BGG	2017-19
Dissertation Committee Member, Rohini Singh, BGG	2016-
Dissertation Committee Member, Alexandra Brown, BGG	2016-19
Dissertation Committee Member, Un-Sa Lee, BGG	2016-
Dissertation Committee Member, Run Jin, BGG	2016-
Dissertation Committee Member, Michael Warner, BGG	2016-19
General exam committee member, Tomohiro Kumon, BGG	2017
General exam committee member, Michael Warner, BGG	2016

Independent Study (BIOL 399, 499) Sponsorships

Co-sponsor, Peter Nyguyen	2021
Co-sponsor, Leah Ragno	2021
Co-sponsor, Harris Avgousti	2020
Sponsor, Regina Fairbanks	2020
Co-sponsor, Stone Chen	2020
Co-sponsor, Olivia Crocker	2019,20
Co-sponsor, Christopher Lee	2019,20
Co-sponsor, Catherine Ruan	2019,20
Sponsor, Alexander Gottfried	2019
Co-sponsor, Sanjana Adurty	2019
Co-sponsor, Daphne Yang	2018
Co-sponsor, Olivia Crocker	2019
Co-sponsor, Giovanna Sena	2019
Co-sponsor, Daphne Yang	2018
Co-sponsor, James Nassur	2018,19
Co-sponsor, Sanjana Adurty	2018
Sponsor, MacKenzie Mauger	2017
Co-sponsor, Ying Xiong	2016,17
Co-sponsor Molly Brothers	2016,17

School of Arts and Sciences

SAS Graduate Studies, Dissertation Progress During a Pandemic Panel	2020
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CTL Workshop Panelist, Developing a New Course *postponed due to COVID	2020
Take your professor to lunch program (x5)	2018,19
Time Management Workshop Speaker, "The First Two Years" Program	2018,19
Velay Fellowship Selection Committee	2016
Judge, "Pop Talks" (Penn Graduate Women in Science and Engineering)	2015

Outreach

PennFERBS program (Freshmen Exposure to Research in Biological Sciences)	2021
"Meet at Real Geneticist" visit to The Revolution School, Philadelphia, PA	2020
Penn Laboratory Exposure to Natural Sciences "LENS" program (Philadelphia High School Students)	2020
Penn Summer Engineering Academy, Guest Lecturer	2019
"This Week in Evolution" (TWiEVO) Podcast Guest	2018
Philadelphia High School Teacher Development Course, Guest	2017

Professional Development

Broadening Horizons Workshop (promoting inclusivity around identities)	2021
Addressing bias in recruitment workshop (Office of AA & EOP)	2021
Rachel Cargle's "Do the work" training for Levine Lab	2020
CTL Inclusive Teaching Workshop	2020
CTL Inclusivity Mentoring Workshop	2020
Genetics Society of America Early Career Workshop	2018
CTL Workshop on Inclusive Teaching	2018
Penn Faculty Pathways Program	2017-19
SAS Search Committee Members Orientation Diversity Training	2017
CTL Workshop on Inclusive Teaching	2016

Students Mentored at Penn

Kurtis Mccannell, BGS Graduate Student
Regina Fairbanks, undergraduate work-study student
Will Gaines, PURM student
Abigail DiVito, Biology Graduate Student
Alexander Gottfried, PURM student
Samira Mehta, Vagelos Scholar
Kevin Yang, PURM Summer Student
Juan Botero, PURM Summer Student
Christopher Pai, BGS rotation student
MacKenzie Mauer, undergraduate work-study student
Jennifer Aleman, BGS rotation student

Current Levine Lab Personnel

Bastien Saint-Leandre, PhD, *Postdoctoral Scientist*

Cara Brand, PhD, *LSRF Postdoctoral Scientist*

Abigail DiVito, *Graduate Student* (co-advised with P. Schmidt)

Sung-Ya Lin, *Graduate Student*

Skyler Berardi, *Graduate Student* (co-advised with P. Schmidt)

Kurtis McCannell, *Graduate Student* (co-advised with M. Lampson)

Alexander Gottfried, *Undergraduate Researcher*, *Ben Franklin Scholar*

Regina Fairbanks, *Undergraduate Researcher*, *Goldwater Scholarship recipient*

Maira Asif, *PennFERBS Undergraduate Researcher*