

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

Associate Professor of Biology, Univ. of Pennsylvania, Philadelphia, PA	2022-
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	2015-22
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- 07/23
\$250,000 direct costs, yearly
"Causes and functional consequences of chromatin evolution"
Role: PI

R21 HD102801-02 NIH/NICHD R21 07/20-07/23
"Evolutionary innovation to preserve zygotic genome integrity"
\$150,000 total direct costs, yearly
Role: PI (dual-PI grant with Michael Lampson)

Current Intramural Funding

Seed grant, Penn Center for Genome Integrity, University of Pennsylvania
"Causes and consequences of TRF2 evolution in primates"
\$65,000 total direct costs 02/20-
Role: PI

Completed Funding

University Research Fund, University of Pennsylvania 05/19-03/20
"Epigenetic regulation of reproductive arrest"
\$37,219 total direct costs
Role: PI

1KR00GM107351 NIH/NIGMS R00 07/15-06/18
"Evolutionary and functional diversification of chromatin proteins"
\$147,421 direct costs, yearly
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

Brand, C.L. and **M.T. Levine** (2022) Cross-species incompatibility between a DNA satellite and a chromatin protein poisons germline genome integrity. *Current Biology* 32, 2962–2971.

- **Additional coverage:** Bladen, J. and N. Phadnis. Genome evolution: a story of species and satellites. *Current Biology* 32, 2962–2971.

Kumon T., Ma, J., Stefanik, D., Nordgren, E., Akins, R.B., Kim, J., **Levine, M.T.**, and M.A. Lampson (2021) Centromere drive and suppression by parallel pathways for recruiting microtubule destabilizers. *Cell* 184:4904-4918.e11

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 – peer reviewed Reviews

Brand C.L. and **M.T. Levine** (2021) Functional diversification of chromatin on rapid evolutionary timescales. *Annual Review of Genetics*. 55: 18.1-18.25

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

Publications – not peer reviewed

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

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: 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

Transposons-in-Barbados Workshop	2023
Wayne State University, Dept of Biological Sciences	2022
Stowers Institute Research Conference on Repetitive DNA	2022
University of Michigan, Dept of Ecology and Evolutionary Biology	2022
American Genetic Association Symposium, Bainbridge Island	2022
Rutgers University, Department of Genetics	2021
EMBL Mobile Genome Conference, Heidelberg, Germany	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
*Graduate student invited speaker	
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
*Graduate student invited speaker	
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

Professional Development

Eliminating Bias in Peer Review, NIH Center for Scientific Review	2021
UPenn Biology x Science Friday - Breakthrough Inclusive Action Toolkit	2021
Broadening Horizons Workshop (promoting inclusivity around identities)	2021
Addressing bias in recruitment workshop (Office of AA & EOP)	2021
Rachel Cargle's "Do the work" anti-racism training for Levine Lab	2020
Epigenetics Institute Workshop on the publication process	2020
Epigenetics Institute Workshop on grant preparation	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

University Teaching

2022

Co-instructor: BIOL 221 *Molecular Biology and Genetics* (50%, 116 students)
 Instructor: BIOL433 *Genetics of Adaptation: How sex, pathogens, and the environment shape modern genomes* (100%, 18 students)

2021

Co-instructor: BIOL 221 *Molecular Biology and Genetics* (50%, 137 students)

2020

Co-instructor: BIOL 221 *Molecular Biology and Genetics* (50%, 147 students)
 Instructor: BIOL433 *Genetics of Adaptation: How sex, pathogens, and the environment shape modern genomes* (100%, 18 students)
 Guest Lecturer: BIOL 540 *Genetic Analysis* (1 lecture)

2019

Co-instructor: BIOL 221 *Molecular Biology and Genetics* (50%, 133 students)
 Instructor: BIOL433 *Genetics of Adaptation: How sex, pathogens, and the environment shape modern genomes* (100%, 17 students)
 Guest Lecturer: BIOL 483 *Epigenetics* (1 lecture)

Filmed “Evolutionary Theory” segment for “Philosophy of Science” Coursera course lead by Dr. Michael Weisberg (SAS, Philosophy)

2018

Instructor: BIOL 221 *Molecular Biology and Genetics* (50%, 99 students)

Guest Lecturer: BIOL 483 Epigenetics (1 lecture)

2017

Instructor: BIOL433 *Genetics of Adaptation: How sex, pathogens, and the environment shape modern genomes* (100%, 21 students)

Guest Lecturer: BIOL 483 Epigenetics (1 lecture)

Guest Lecturer: BIOL 410 Advanced Evolution (1 lecture)

2016

Guest Lecturer: BIOL 540 Advanced Topics in Genetics (1 lecture)

Academic Service

Biology Department

Departmental Review, co-lead on departmental size report	2022
Executive Committee	2022-
Panelist, Best Mentoring Practices (Biology/EES)	2022
Co-chair, Target of Opportunity Recruitment Committee	2021-
Lead, Genetics, Epigenetics, and Genomic Vision Statement Committee	2021-
Biology Department Curriculum Committee	2021-
Graduate Student Advising Committee	2019-21
Intro to Biology Dept. Research Presentation in BIOL102	2019
Meet-A-Professor information session for biology majors	2018
Biology Seminar Series, Committee Chair	2018-20
Biology Seminar Series Committee Member	2017
Animal Behavior Search Committee Member	2017
Biology majors information session speaker	2017
Graduate Group Recruitment Planning Committee Chair	2016-19
Biology Graduate Group Recruitment Visit Seminar Speaker	2016-18
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

Faculty advisor for majors

- Valentina Rodriguez (C'20)
- Liam Forsythe (C'21)
- Ryan Hood (C'21)
- Vincent Paik (C'22)

- Lealem Aderie (C'22)
- Alexandra Raday (C'22)
- Laurence Maeter (C'22)
- Noah Beratan (C'23)
- Nikhil Joshi (C'23)
- Jesse Quatses (C'23)
- Alexandra Lin (C'23)
- Amanda Hsieh (C'23)
- Makaeel Sheikh (C'23)
- Elizabeth Bader (C'24)
- Isabella Farkas (C'24)
- Hannah Futeran (C'24)
- Joseph Park (C'24)
- Dhivya Arasappan (C'24)
- Caroline Pain (C'24)
- Mengxiang Chen (C'24)
- Makaeel Shkeikh (C'24)
- Hayden Seisel (C'24)

Graduate Student Committees

(BGG = Biology Graduate Group, G&E = Genetics and Epigenetics, CAMB)

Qualifying Exam Committee Member, Benjamin Glass, BGG	2022
Qualifying Exam Committee Member, Zhengfeng Liu, BGG	2022
Qualifying Exam Committee Member, Zachary Gardner, G&E	2022
Dissertation Committee Member, Rupa Khanal, BGG	2022-
Dissertation Committee Member, Patrick Walsh, G&E	2021-
Dissertation Committee Member, Dajia Ye, Biology	2021-
Dissertation Committee Member, Edgar Monteiro, BGG	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	2017-21
Dissertation Committee Member, Tomohiro Kumon, BGG	2017-21
Dissertation Committee Member, Riley Graham, BGG	2017-19
Dissertation Committee Member, Rohini Singh, BGG	2016-20
Dissertation Committee Member, Alexandra Brown, BGG	2016-19
Dissertation Committee Member, Un-Sa Lee, BGG	2016-
Dissertation Committee Member, Run Jin, BGG	2016-20
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, Laurence Maeter	2022
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Co-sponsor, Katrin Gross	2022
Sponsor, Hannah Futuran	2022
Co-sponsor, Sumiya Olson	2021
Co-sponsor, Isabella Cossu	2021
Co-sponsor, Peter Nyguyen	2021
Co-sponsor, Leah Ragno	2021
Co-sponsor, Ryan Hood	2020
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, University

PSOM tenure review committee, ad hoc member	2022
SAS Committee on Graduate Education	2022-25
Faculty Sponsor, Penn Women in Life Sciences	2022
Epigenetics Institute Pilot Grant Review Panel	2022
Penn Center for Genome Integrity Retreat Planning Committee	2022
SAS Graduate Studies, Dissertation Progress During a Pandemic Panel	2020
CTL Workshop Panelist, Developing a New Course *postponed due to COVID	2020
Organizer, “Nuclear Structure Club” (monthly supergroup with 4 PSOM labs)	2019-
Take your professor to lunch program (x5)	2018,19
Time Management Workshop Speaker, “The First Two Years” Program	2018,19,22
Velay Fellowship Selection Committee	2016
Epigenetics Institute Website Committee	2017,18
Membership, CAMB graduate group, Perelman School of Medicine	2015-
Judge, “Pop Talks” (Penn Graduate Women in Science and Engineering)	2015

Community

Session Chair, Molecular Mechanisms of Evolution, Gordon Research Conference	2023
Organizing Committee Member, Genetics Society of America’s annual	2022-23

Drosophila Research Conference	
Organizing Committee Member, EMBO Evo-Chromo Workshop.	2022-23
Guest Editor, <i>Proceedings of the National Academy of Sciences</i>	2022
NIH Genetic Variation and Evolution (GVE) Study Section (<i>ad hoc</i> member)	2021
Thesis defense committee member, Evan Witt (Rockefeller University)	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	2017-20
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> , <i>Trends in Genetics</i>	
Member, Genetics Society of America	
Member, Society for Molecular Biology and Evolution	

Outreach

Philadelphia High School Teacher Development Course, Guest Speaker	2022
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 Speaker	2017

Previous Levine Lab trainees/staff

Courtney Christopher , <i>Research Specialist</i>	2015-21
Bastien Saint-Leandre, PhD , <i>Postdoctoral Scientist</i>	2016-21
Quentin Helleu, PhD , <i>Postdoctoral Researcher</i>	2016-17
MacKenzie Mauger , <i>work-study student</i>	2016-19
Jennifer Aleman , <i>BGS rotation student</i>	2016
Kevin Yang , <i>PURM Summer Student</i>	2017
Christopher Pai , <i>BGS rotation student</i>	2017
Regina Fairbanks , <i>Undergraduate Researcher, Goldwater recipient</i>	2018-21
Juan Botero , <i>PURM, Undergraduate Researcher</i>	2017-18
Alexander Gottfried , <i>Undergraduate Researcher, PURM</i>	2018-21
Will Gaines , <i>PURM Summer Student</i>	2018
Samira Mehta , <i>Vagelos Scholar summer student</i>	2018
Maira Asif , <i>PennFERBS Undergraduate Researcher</i>	2021-22

Current Levine Lab trainees

Cara Brand, PhD , <i>LSRF Postdoctoral Scientist</i>	2018-
Abigail DiVito , <i>Graduate Student</i> (co-advised by P. Schmidt)	2018-
Sung-Ya Lin , <i>Graduate Student, Taiwanese Govt Fellowship Recipient</i>	2020-
Isabella Farkas , <i>Undergraduate Researcher</i>	2021-
Hannah Futeran , <i>Undergraduate Researcher</i>	2021-
Hyuk-Joon Jeon , <i>Postdoctoral Scientist</i> (co-advised by M. Lampson)	2021-