

Mia T. Levine, PhD

Department of Biology and Epigenetics Institute
 University of Pennsylvania
 204B Carolyn Lynch Laboratories
 Philadelphia, PA 19104-6081
 m.levine@sas.upenn.edu 215-573-9709

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 Chair of Biology, Univ of Pennsylvania, Philadelphia, PA	2023-
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	2023
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

GM124684-06 NIH/NIGMS R35 Maximizing Individual Researchers' Award for Early Stage Investigators 09/17- 07/27

\$280,000 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 07/23-

Telomere regulation during mammalian pre-implantation development

\$79,104 total direct costs

Role: PI

Completed Funding

Seed grant, Penn Center for Genome Integrity 02/20-06/23

“Causes and consequences of TRF2 evolution in primates”

\$65,000 total direct costs

Role: PI

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

Divito-Evans, A., Fairbanks, R., Schmidt, P. and **M.T. Levine** (2022) An epigenetic basis of adaptive plasticity in *Drosophila melanogaster*. In revision for *PLoS Genetics* preprint: www.biorxiv.org/content/10.1101/2022.10.11.511590v2

Brand, C.L. and **M.T. Levine** (2022) Cross-species incompatibility between a DNA satellite and the *Drosophila* Spartan homolog 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

6 th Canadian Symposium on Telomeres & Genome Integrity, *keynote	2024
Washington University, Dept of Genetics	2023
The New York City Genome Integrity Meeting	2023
Princeton University, Butler Seminar Series, MolBio	2023
Stanford Genetics Conference on Structural Variants and DNA Repeats	2023
Predicting Evolution, EMBO Workshop, Heidelberg, Germany	2023
The Fragile Nucleosome Series, Virtual	2023
University of Edinburgh, Dept of Ecology and Evolution	2023
Indiana University, Dept of Biology	2023
New York Area Population Genomics Meeting, Rockefeller Univ, *keynote	2023
Transposons-in-Barbados Workshop	2023
Wayne State University, Dept of Biological Sciences	2022
Stowers Institute Research Conference, “Stuck on Repeat”	2022
University of Michigan, Dept of Ecology and Evolutionary Biology	2022
American Genetics 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
*cancelled 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

Professional Development

Penn Faculty Fellow	2023-24
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

2023

Co-instructor: BIOL 221 *Molecular Biology and Genetics* (50%, 110 students)

Instructor: BIOL433 *Genetics of Adaptation: How sex, pathogens, and the environment shape modern genomes* (100%, 19 students)

Guest Lecturer: BIOL 540 Genetic Analysis (1 lecture)
Guest Lecturer: Meiosis, Recombination & Sex, University of North Carolina, Chapel Hill

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

Faculty Career Panel Session	2023
Departmental Review, co-lead quantitative comparison document	2022
Biology Department 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 ('20), Liam Forsythe ('21) Ryan Hood ('21) Vincent Paik ('22) Lealem Aderie ('22) Alexandra Raday ('22) Laurence Maeter ('22), Noah Beratan ('23), Nikhil Joshi ('23), Jesse Quatses ('23), Alexandra Lin ('23), Amanda Hsieh ('23), Makaeel Sheikh ('23), Elizabeth Bader ('24), Isabella Farkas ('24), Hannah Futeran ('24), Joseph Park ('24), Dhivya Arasappan ('24), Caroline Pain ('24), Mengxiang Chen ('24), Makaeel Shkeikh ('24), Hayden Seisel ('24), Lidia Hassen ('25)

Qualifying Exam Committee Member

Peter Ishola (BGG '23), Benjamin Glass (BGG '22), Zhengfeng Liu (BGG '22), Zachary Gardner (G&E '22), Tomohiro Kumon (BGG '17), Michael Warner (BGG '16)

Dissertation Committee Member

Biology Graduate Group

Minhao Li ('23-), Skyler Berardi ('23-), Zhengfeng Liu ('22-), Rupa Khanal ('22-), Dajia Ye ('20-), Edgar Monteiro ('20-), Linyang Ju ('19-), Yonguin Li ('19-'23), Ozan Kiratli ('17-'22), Tomohiro Kumon ('17-'21), Riley Graham ('17-'19), Rohini Singh ('16-'20), Alexandra Brown ('16-'19), Run Jin ('16-'20), Michael Warner ('16-'19).

Genetics and Epigenetics Group

Patrick Walsh ('21-), Randi Isenhardt, ('19-'23), Jennifer Aleman ('17-'21)

Independent Study (BIOL 399, 499)

Co-Sponsor: Mia Shuie ('23), Sanya Mehta ('23), Laurence Maeter ('22), Katrin Gross ('22, '23), Sumiya Olson ('21), Isabella Cossu ('21), Peter Nguyen ('21), Leah Ragno ('21, '22), Ryan Hood ('20), Harris Avgousti ('20), Stone Chen ('20), Olivia Crocker ('19, '20), Christopher Lee ('19, '20), Catherine Ruan ('19, '20), Sanjana Adurty ('19), Daphne Yang ('19), Giovanna Sena ('18), Daphne Yang ('18), James Nassur ('18), Sanjana Adurty ('18), Ying Xiong ('16, '17), Molly Brothers ('16, '17)

Sponsor: Isabella Farkas, ('23), Hannah Futuran ('22), Regina Fairbanks ('20), Alexander Gottfried ('19), MacKenzie Mauger ('17)

School of Arts and Sciences, University

Grad School in "3-2-1" Interviewee with Dean of Graduate Studies	2023
Class of 2027 Pre-major advisor	2023-25
SAS Graduate Studies, "The Hidden Curriculum" Workshop, Panel Member	2023
Chair, PCGI minisymposium "Repetitive DNA and Development"	2023
Time Management Workshop Speaker, "The First Two Years" Program	2022
PSOM promotion 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	2022,23
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
Time Management Workshop Speaker, "The First Two Years" Program	2019
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
Velay Fellowship Selection Committee	2016
Epigenetics Institute Website Committee	2017,18
Judge, "Pop Talks" (Penn Graduate Women in Science and Engineering)	2015

Community

Co-chair, GRC Molecular Mechanisms of Evolution	2027
Vice co-chair, GRC Molecular Mechanisms of Evolution	2025
Organizing Committee, Genetics Society of America's Population Quantitative, and Evolutionary Genetics Conference	2023-24
Editor, <i>Seminars in Cell Biology and Development</i> special issue on Genetic Conflicts	2022-23
Session Chair, Molecular Mechanisms of Evolution, Gordon Research Conference	2023
External Committee Member, Luca Soldini, U of Lausanne	2023-
Human Frontier Science Program Organization, <i>ad hoc</i> review	2022
NSF, Division of Molecular and Cellular Biosciences, <i>ad hoc</i> review	2022
Organizing Committee Member, Genetics Society of America's annual Drosophila Research Conference	2022-23
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
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— *Science, Nature Genetics, eLife, Current Biology, PLoS Genetics, Proceedings of the National Academy of Sciences, Genetics, Molecular Cell, Molecular Biology and Evolution, Heredity, Fly, Proc. Roy. Soc, BMC Genomics, Genome Biology and Evolution, NY Academy of Sci, Bioessays, Journal of Molecular Biology, Nucleic Acids Research, Mobile DNA, Molecular Ecology, Trends in Genetics, Chromatin and Epigenetics*

Outreach

Masterman High School, Biology Club, “Becoming a scientist”	2023
Masterman High School, AP Biology class, lecture: “Molecular Arms Races”	2023
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
Abigail DiVito , <i>Graduate Student (co-advised by P. Schmidt)</i>	2018-23

Current Levine Lab trainees

Cara Brand, PhD , <i>LSRF Postdoctoral Scientist, K99 Recipient</i>	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, PhD *Postdoctoral Scientist* (co-advised by M. Lampson)

2021-

Genevieve Oliver, *Undergraduate Researcher*

2023-

Ethan Burian, Undergraduate Researcher

2023-