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 *with honors*, University of Pennsylvania, 1999

 *magna cum laude*

**Professional Experience**

Member, Penn Center for Genome Integrity, Philadelphia, PA 2019-

Assistant Professor of Biology, Univ. of Pennsylvania, Philadelphia, PA 2015-

Core Faculty Member, Penn Epigenetics Institute, Philadelphia, PA 2015-

Postdoctoral Fellow, Fred Hutchinson Cancer Research Center, Seattle, WA 2009-15

Advisor: Harmit Malik (*Evolutionary cell biology)*

*Causes and functional consequences of chromatin protein evolution*

**Awards and Fellowships**

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’** 09/17- 07/22

**Award for Early Stage Investigators**

“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

“Causes and consequences of TRF2 evolution in primates” 02/20-01/21

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**

*at Penn:*

*(€ = review/preview)*

### *€* 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.

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.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**.**

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

*pre-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 remodelling 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., LeeY.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

Vanderbilt University, Biological Sciences Department 2020

Rutgers University-Camden, Ctr of Computational and Integrative Biology 2020

Max Planck Institute for Evolutionary Biology, Ploen, Germany 2020

\*postponed due to COVID

Carnegie Institution, Department of Embryology 2020

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

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 Biology2017

Perelman School of Medicine, U of Pennsylvania, Department of Genetics2017

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

New York University, Center for Genomics and Systems Biology 2014

University of Pennsylvania, Evolution Cluster 2014

Fred Hutchinson Cancer Research Center, Seattle WA 2012

**Recent Conference Platform Presentations**

**M.T. Levine** (2020) A Drosophila telomere protein evolves adaptively to contain telomeric retrotransposons. *Genetic Society of America, TAGC*. \*online

**M.T. Levine** (2019) Intra-genomic conflict shapes Drosophila telomere biology. *International Meeting on Drosophila Heterochromatin*. Spoleto, Italy.

**M.T. Levine** (2018) Intra-genomic conflict shapes Drosophila telomere biology.

Company of Biologists Workshop, Evo-chromo: towards an integrative approach of chromatin dynamics across eukaryotes. Sussex, UK.

**M.T. Levine** (2018) Intra-genomic conflict shapes Drosophila telomere biology. *Society for the Study of Evolution*. Montpellier, France.

**Professional Development**

Genetics Society of America Early Career Workshop 2018

CTL Workshop on Inclusive Teaching Participant 2018

Penn Faculty Pathways Program Participant 2017-19

SAS Search Committee Members Orientation Diversity Training 2017

CTL Workshop on Inclusive Teaching Participant 2016

**University Teaching**

**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

**Independent Study Students**

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

**Academic Service**

**Biology Department**

Graduate Student Advising Committee 2019

Intro to Biology Dept. Research Presentation in BIOL102 2019

Faculty advisor for majors 2019

* 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-

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)

Dissertation Committee Member, Linyang, Ju, BGG 2019-

Dissertation Committee Member, Yonguin Li, BGG 2019-

Dissertation Committee Member, Randi Isenhart, 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

**School of Arts and Sciences**

CTL Workshop Panelist, Developing a New Course 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

**Community**

Session Chair, Molecular Mechanisms of Evolution, GRC 2021

eLIFE, Reviewing Board of Editors 2019-

Walter Fitch Award/Student Travel Award Committee Member, Society for 2018

Molecular Biology and Evolution

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— *eLIFE, Current Biology, PLoS Genetics, Proceedings of the National*

 *Academy of Sciences, Genetics, Molecular Biology and Evolution, Heredity,*

 *Proc. Roy. Soc, BMC Genomics, Genome Biology and Evolution, NY*

 *Academy of Sci, Chromatin and Epigenetics, Bioessays, Journal of*

 *Molecular Biology, Nucleic Acids Research, Molecular Ecology*

**Outreach**

Penn LENS program for 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

**Students Mentored at Penn**

**Skyler Berardi,** *Rotation Student*

**Sung-Ya Lin**, *Rotation Student*

**Kurtis Mccannell**, *Rotation Student*

**Regina Fairbanks,** undergraduate work-study student

**Will Gaines,** PURM student

**Abigail DiVito**, 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 Mauger**, undergraduate work-study student

**Jennifer Aleman**, BGS rotation student

**Current Levine Lab Personnel**

*(in order of arrival)*

**Courtney Leek, BA,** *Lab Manager/Research Specialist* 09/2015-

**Bastien Saint-Leandre,** **PhD**, *Postdoctoral Scientist*  04/2016-

**Abigail DiVito,** *Graduate Student*  03/2018-

**Alexander Gottfried,** *Undergraduate Researcher*  03/2018-

**Regina Fairbanks,** *Undergraduate Researcher* 09/2018-

**Cara Brand**, **PhD**, *LSRF Postdoctoral Scientist*  09/2018-

**Sung-Ya Lin,** *Graduate Student* 06/2020-

**Skyler Berardi**, *Graduate Student*  03/2020-

**Kurtis McCannell,** Rotation Student 09/2020-