Hannah M. Shoenhard, Ph.D.

Assistant Professor of Biology,
Bryn Mawr College
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EDUCATION AND RESEARCH EXPERIENCE

2022- 2024 **University of Pennsylvania, Philadelphia, PA – postdoctoral research**
Laboratory of Amita Sehgal, Ph.D.
Chronobiology and Sleep Institute, Perelman School of Medicine
Project: Cellular and molecular basis of sleep-dependent versus sleep-independent memory consolidation in the fruit fly (*Drosophila melanogaster*)

2014-2022 **University of Pennsylvania, Philadelphia, PA – Ph.D.**
Neuroscience Graduate Group
Laboratory of Michael Granato, Ph.D.
Thesis: Circuit analysis of the Calcium Sensing Receptor (CaSR) in sensorimotor decision-making in the larval zebrafish.

2013-2014 **Scripps College, Claremont, CA – B.A. Neuroscience, Philosophy (double major), *summa cum laude***
Laboratory of Melissa Coleman, Ph.D.
Thesis: Effects of lesions of auditory input to an identified premotor area on zebra finch song
Research project: Behavioral characterization of duetting in the plain-tailed wren

2011 **University of Nevada-Reno, Undergraduate research assistant**
Laboratory of Michael Crognale, Ph.D.
Research project: Measurement and analysis of visual cortex responses to color in a patient with cerebral achromatopsia.

RESEARCH INTERESTS

- **Cell biology of learning and memory:** Uncovering the cell biological processes, metabolic pathways, and intracellular signaling mechanisms that underlie learning and memory using behavioral, genetic, and imaging-based techniques.

- **Sleep, autophagy, and neuronal plasticity:** Probing the cellular recycling process of autophagy as a mechanism for neuronal plasticity that occurs during and/or is facilitated by sleep.

PUBLICATIONS

Research Articles

Hannah Shoenhard and Amita Sehgal. 2025. “Coordinating the Energetic Strategy of Glia and Neurons for Memory.” *Trends in Neurosciences* 48 (2): 93–95. https://doi.org/10.1016/j.tins.2025.01.001.

Yun-Feng Zhang, Yinggi Wang, Natalie L. Johnson, Janardhan P. Bhattarai, Camilo Guevara Espitia, **Hannah Shoenhard**, Marc V. Fuccillo, Daniel W. Wesson, Minghong Ma. Ventral striatal islands of Calleja neurons bidirectionally mediate depression-like behaviors in mice. *Nat Commun* **14**, 6887 (2023). https://doi-org /10.1038/s41467-023-42662-z

Hannah Shoenhard and Michael Granato. Multivariate analysis of variegated expression in neurons: A strategy for unbiased localization of gene function to candidate brain regions in larval zebrafish (2023). *PLoS ONE* 18(2): e0281609. https://doi.org/10.1371/journal.pone.0281609

Jessica Nelson, **Hannah Shoenhard**, and Michael Granato. Integration of cooperative and opposing molecular programs drives learning-associated behavioral plasticity (2023). *PLoS Genetics* 19(3): e1010650. https://doi.org/10.1371/journal.pgen.1010650

Hannah Shoenhard, Roshan A. Jain, and Michael Granato. The Calcium-Sensing Receptor (CaSR) regulates sensorimotor decision-making via a hindbrain neuronal cluster (2022). *Cell Reports* 41 (10). DOI: https://doi.org/10.1016/j.celrep.2022.111790

Thomas Valles, **Hannah Shoenhard**, Joseph Zinski, Sarah Trick, Mason Porter, and Michael Lindstrom (2021). Networks of necessity: preventing the spread of COVID-19 among disabled people and their caregivers. PLOS Computational Biology.https://doi.org/10.1371/journal.pcbi.101004

Owen Randlett, Martin Haesemeyer, Greg Forkin, **Hannah Shoenhard**, Alexander F. Schier, Florian Engert, Michael Granato (2019) Distributed plasticity drives visual habituation learning in larval zebrafish. *Current Biology* 29 (8). PMID: 30955936

Roshan A. Jain, Marc A. Wolman, Kurt C. Marsden, Jessica C. Nelson, **Hannah Shoenhard**, Hannah Bell, Julianne Skinner, Emilia Cobbs, Keisuke Sawada, Amy Zamora, Michael Granato (2018) A forward genetic screen in zebrafish identifies the G-protein coupled receptor CaSR as a regulator of sensorimotor decision-making. *Current Biology* 28 (9). PMID: 29681477

Michael A. Crognale, Chad Duncan, **Hannah Shoenhard**, Dwight Peterson, & Mariann Berryhill (2013) The locus of color sensation: Cortical color loss and the chromatic visual evoked potential. *J. Vis.* 13(10). pii: 15. doi: 10.1167/13.10.15.

Policy Papers

Michael Lindstrom, Mason Porter, **Hannah Shoenhard**, Sarah Trick, Thomas Valles, and Joseph Zinski (2020). Networks of necessity: preventing the spread of COVID-19 among disabled people and their caregivers (white paper). Stable URL: https://www.math.ucla.edu/~mikel/research/COVID19/network_covid_whitepaper_final.pdf

INVITED TALKS

1. "Differential roles for autophagy in sleep-dependent versus sleep-independent long-term memory consolidation." Women in Autophagy 5th Annual Symposium (flash talk).
2. "The Calcium-Sensing Receptor (CaSR) regulates zebrafish sensorimotor decision-making via a genetically defined cluster of hindbrain neurons." Gordon Research Seminar on Molecular and Cellular Neurobiology. Ventura, California. July 23, 2022.
3. "The Calcium-Sensing Receptor (CaSR) regulates zebrafish sensorimotor decision-making via a genetically defined cluster of hindbrain neurons." International Zebrafish Society Conference, Montreal, Quebec, Canada. June 23, 2022.
4. "Circuits and genes for sensorimotor decision-making in the larval zebrafish." Neuroscience Training Grant/ Vision/ CANAC Retreat, May 23, 2019.
5. "Genetic analysis of sensorimotor decision-making in larval zebrafish." Neuroscience Graduate Group's Graduate Research in Progress Presentations, April 25, 2018.
6. "Song stability after perturbations of auditory pathways in the zebra finch." Small Circuits and Behavior meeting, University of Pennsylvania. August 1, 2016.
7. "Tuning the brain: How plasticity allows birds to sing." Penn Open Labs Science Café, University of

Pennsylvania. October 22, 2016.

RESEARCH POSTER PRESENTATIONS

Bryn Mawr and Haverford research mentees are underlined.

1. Bianca Perez-Ouhirra*, Emelyn Cook*, and **Hannah Shoenhard**. Comparing metabolic strategies for long-term memory consolidation during wake versus sleep. University of Pennsylvania 40th Annual Mahoney Institute for Neuroscience "Year of Sleep" Symposium. Philadelphia, PA. April 2025. *authors contributed equally
2. **Hannah Shoenhard** and Amita Sehgal. Energetic Basis for Sleep-Dependent versus Sleep-Independent Long-Term Memory in Drosophila melanogaster. Gordon Research Conference and Gordon Research Seminar on Sleep Regulation and Function. Galveston, TX. March 2024.
3. **Hannah Shoenhard**, Roshan Jain, and Michael Granato. Genetic and circuit analysis of Calcium Sensing Receptor (CaSR) in sensorimotor decision-making. Cold Spring Harbor Labs Zebrafish Neural Circuits and Behavior meeting, Cold Spring Harbor, NY. November 2019.
4. **Hannah Shoenhard**, Roshan Jain, and Michael Granato. Genetic and circuit mechanisms for sensorimotor decision-making in larval zebrafish. Jefferson Synaptic Biology Symposium, Thomas Jefferson University, Philadelphia, Pennsylvania. May 2019.
5. **Hannah Shoenhard**, Roshan Jain, Marc Wolman, Kurt Marsden and Michael Granato. Genetic analysis of sensorimotor decision-making in larval zebrafish. Cold Spring Harbor Labs Neuronal Circuits meeting, Cold Spring Harbor, NY. April 2018.
6. **Hannah Shoenhard**, Roshan Jain, Marc Wolman, Kurt Marsden and Michael Granato. Genetic analysis of sensorimotor decision-making in larval zebrafish. Philadelphia Society for Neuroscience, Philadelphia, PA. April 2018.
7. **Hannah Shoenhard**, Roshan Jain, Marc Wolman, Kurt Marsden and Michael Granato. Molecular-genetic analysis of simple decision-making in larval zebrafish. The Allied Genetics Conference, Orlando, FL. July 2016.
8. **Hannah Shoenhard**, Zachary Burkett, Nancy F. Day, and Melissa Coleman. Higher-order processing in the auditory system of the zebra finch, *Taeniopygia guttata.* Society for Neuroscience meeting, Washington, D.C. November 2014.
9. **Hannah Shoenhard**, Zachary Burkett, Nancy F. Day, and Melissa Coleman. Contributions of higher-order auditory cortical areas to adult song maintenance in the zebra finch, *Taeniopygia guttata*. International Congress of Neuroethology meeting, Sapporo, Japan. July 2014.
10. Karun Kiani, **Hannah Shoenhard**, Eric Fortune, Melissa Coleman. Visual and auditory contributions in a highly synchronized duet song. International Congress of Neuroethology meeting, Sapporo, Japan. July 2014.
11. Eric Fortune, Carlos Rodriguez, **Hannah Shoenhard**, Karun Kiani, Melissa Coleman. Duet matching in plain-tailed wrens. International Congress of Neuroethology meeting, Sapporo, Japan. July 2014.
12. **Hannah Shoenhard**, Zachary Burkett, and Melissa Coleman. Lesions of auditory input to an identified premotor area produce behavioral effects similar to deafening. Mechanisms of Communication satellite meeting of Society for Neuroscience, San Diego, CA. November 2013.
13. **Hannah Shoenhard**, Chad Duncan, Chris Jones, Michael Crognale. Normal chromatic VEPs in a case of cerebral dyschromatopsia. Vision Sciences Society meeting, Naples, FL. May 2012.

SERVICE

Peer review

- *Genetics*, Spring 2025
- *Nature Communications*, Summer 2024

SENIOR THESIS AND LABORATORY MENTORSHIP

Senior Thesis Students

- Savannah Ghermay*, Bryn Mawr College Neuroscience Major, Spring 2025 (Fall 2025 graduation)
- Carly Priest, Haverford College, Summer 2025 – Spring 2026
- Savannah Shaw, Haverford College, Summer 2025 – Spring 2026

*literature review senior thesis

Laboratory Students

- Bianca Perez-Ouhirra, Bryn Mawr College, Spring 2025 –
- Emelyn Cook, Bryn Mawr College, Spring 2025 –

TEACHING AND MENTORING EXPERIENCE

Spring 2025 **Instructor of record**, Bryn Mawr College
BIOL 338: Learning and Memory
BIOL 202: Neurobiology

Summer 2024 **Laboratory mentor**, Sehgal Lab, Chronobiology and Sleep Institute, University of Pennsylvania

- Mentored R25 undergraduate student Patrick Nichols for an eight-week original research project culminating in a presentation, Summer 2024
- Mentored Yichen Zhang, UPenn Biology PhD student, for a six-week rotation project culminating in a presentation, Spring 2024
- Mentored Kristen Park, UPenn MD/PhD Neuroscience student, for an eight-week rotation project culminating in a presentation, Fall 2023

September 2020 **Guest lecturer**, Cellular and Molecular Neuroscience, Keck Science Department of the Claremont Colleges

2019-2020 **Lesson plan design**, Philadelphia Public Schools high school biology

- Worked with Philadelphia School District's Science Curriculum Coordinator to design lesson plans on CRISPR-Cas9 and stem cells tailored to Pennsylvania's educational standards
- Philadelphia Public Schools biology teachers received professional development credit for attending a demonstration of my lesson plans

December 2017 **Teaching Certificate**, UPenn Center for Teaching and Learning

- Attended teaching workshops, received observation and feedback during a class session from CTL staff, and wrote a teaching philosophy

2017-19 **Guest lecturer**, "The genetics of learning and memory." Molecular and Cellular Neurobiology (BIBB 251), University of Pennsylvania

Summer, Fall 2017 **Curriculum design**, UPenn Netter Center Neuroscience Pipeline program at West High School

- Designed a six-class sequence to introduce high school students to foundational topics in neuroscience
- Teaching was implemented at West High School by Penn undergraduates

Fall 2017-present **Academic Resource Committee member**, UPenn Neuroscience Graduate Group.

- Served as student representative on a faculty mentoring committee for pre-candidacy graduate students. Guided students on class choices, laboratory rotations, and adjusting to graduate life.

Summer 2017 **Co-teacher**, Cell Biology and Biochemistry (BIOM600) Summer preparatory course, University of Pennsylvania, Biomedical Graduate Studies

- Selected salient topics, reviewed materials, prepared problem sets, and led six two-hour summer preview sessions for Cell Biology and Biochemistry.

Fall 2016 **Teaching assistant**, Molecular and Cellular Neurobiology (BIBB251), University of Pennsylvania

- Led weekly three-hour lab and problem-solving sessions with 17 students
- Wrote exam questions, graded exams, and held office hours

Summer 2016 **Laboratory mentor**, Granato Lab, Department of Cell and Developmental Biology, University of Pennsylvania

- Mentored Elizabeth Kahn (high school student, Summer 2016) in performing PCR and running zebrafish behavioral assays

Summer 2012 **Teaching assistant**, Introduction to Laboratory Sciences, Duke Talent Identification Program, Trinity University, San Antonio, TX

- Three-week residential intensive course for gifted 7th and 8th graders
- Prepared laboratory materials, assisted with 7-hour daily class sessions, and led 1-hour review and problem-solving sessions every evening

2012- 2014 **Tutor**, Scripps College peer tutoring program, Claremont, CA

- Met individually for 1-2 hours with 2-3 students once per week
- Assisted with homework problems, exam review, and study habits
- Tutored Accelerated Integrated Science Sequence, Chemistry, Organic Chemistry, and Biochemistry

HONORS AND AWARDS

2023 Award for Persistent Involvement in Community and Leadership, Neuroscience Graduate Group
2022 Jameson-Hurvich Travel Award, Neuroscience Graduate Group
2022 Best Poster, Department of Cell and Developmental Biology Retreat
2019 Jameson-Hurvich Travel Award, Neuroscience Graduate Group
2019 2nd place, All-Ivy 3 Minute Thesis Competition (held at the United Nations in NYC)
2019 1st place, University of Pennsylvania 3 Minute Thesis Competition
2018 Judges' Choice Overall Winner, UPenn graduate student PopTalks competition
2017-19 Behavioral and cognitive neuroscience pre-doctoral training grant, University of Pennsylvania
2016 Hearst Foundation Fellowship
2016 Winner (Biology category), UPenn graduate student PopTalks competition
2016 Honorable mention, NSF Graduate Research Fellowship Program
2014-16 Systems and Integrative Biology Pre-Doctoral Training Grant, University of Pennsylvania
2014 Barbara McClintock Science Award for best senior thesis, Scripps College
2014 Phi Beta Kappa honor society, Scripps College chapter
2013 Barry M. Goldwater Scholarship
2010-14 James E. Scripps scholarship, Scripps College
2010-11 Byrd Scholarship (Nevada)
2010 National Merit Scholar

SERVICE AND OUTREACH

With UPenn Neuroscience Graduate-Led Initiatives and Activities (GLIA)
2016-19 Director, Philadelphia Science Festival Outreach

2016-19 Co-leader, Student-Invited Seminar Speaker Series
2016 Leader – UPenn Neuroscience Graduate Group new student recruitment
2015-16 Public Relations Chair – Graduate-Led Initiatives and Activities Committee
2015-16 Coach – Upward Bound students participating in regional "Brain Bee" competition
2014-16 Editor – "Brains in Briefs" neuroscience outreach program
2013-14 Founder, Director of Events – Socializing with Scientists

Independently
2020-22 Grad school application mentor, Project SHORT
2020 Invited speaker, Penn IRM@Home virtual programming for 7th- 12th graders
2017 Event planner and moderator, "Diversity in STEM" discussion panel
2016 Invited speaker, Open Labs Science Café
2015, 2020 Demonstration leader, larval zebrafish demos with high school students, BioEYES

COURSES AND PROFESSIONAL DEVELOPMENT

Preparing for College Teaching in STEM – Spring 2024
- Eight-week course by UPenn's Center for Teaching and Learning that covered topics such as tailoring a course to students, developing a syllabus, assessment methods, and asynchronous work.

Meaningful Mentorship Mini-Course – Spring 2022
- Five-week course on how to mentor students in a laboratory setting by UPenn's Center for Teaching and Learning. Topics included mentoring diverse students, promoting scientific identity, and establishing clear expectations.

Reclaiming STEM workshop – Summer 2020
- Learned about science communication and policy-making from the perspective of minoritized and marginalized scientists
- Discussed issues of marginalization, discrimination, and inequality in STEM in breakout groups with other workshop participants
- https://reclaimingstem.wardofcode.com/

DIY Transcriptomics – Spring 2020
- Analyzed RNA-seq dataset from pseudoalignment to figure layout
- Attended virtual lectures, Q&A sessions, and hackathons
- https://diytranscriptomics.com/

Active Leaning in STEM Courses – Summer 2015
- Four-week course on active learning pedagogy by UPenn's Center for Teaching and Learning