Jasper Phelps

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EDUCATION

Harvard University   Aug 2016 – Apr 2021 (expected)
Ph.D. in Neuroscience with Distinction in Computational Neuroscience
- Thesis: "The Structure of Motor Control Circuits in Adult *Drosophila*"
- Thesis advisor: Wei-Chung Allen Lee
- Relevant coursework: Cellular Neurophysiology, Systems Neuroscience, Molecular and Developmental Neuroscience, Probabilistic Modeling for Neural Data

Washington University in St. Louis   Aug 2011 – May 2015
B.A. in Neuroscience and Applied Mathematics
- Cumulative GPA: 3.97 / 4.00
- Relevant coursework: Neurophysiology Laboratory, Principles of the Nervous System, Principles in Human Physiology, Biochemistry I and II, Math for the Physical Sciences, Intermediate Statistics, Differential Equations, Engineering and Scientific Computing, Algorithms and Data Structures

PUBLICATIONS   * indicates co-first authorship

J. S. Phelps*, D. G. C. Hildebrand*, B. J. Graham*, A. T. Kuan, L. A. Thomas, T. M. Nguyen, J. Buhmann, A. W. Azevedo, A. Sustar, S. Agrawal, M. Liu, B. L. Shanny, J. Funke, J. C. Tuthill, W.-C. A. Lee. Reconstruction of motor control circuits in adult *Drosophila* using automated transmission electron microscopy. *bioRxiv* (2020) and *Cell* (accepted).
https://doi.org/10.1101/2020.01.10.902478

A. T. Kuan* , **J. S. Phelps***, L. A. Thomas, T. M. Nguyen, J. Han, C.-L. Chen, A. W. Azevedo, J. C. Tuthill, J. Funke, P. Cloetens, A. Pacureanu, W.-C. A. Lee. Dense neuronal reconstruction through X-ray holographic nano-tomography. *Nat Neurosci* (2020).
https://doi.org/10.1038/s41593-020-0704-9

L. Cheadle, S. Rivera, **J. S. Phelps**, K. A. Ennis, B. Stevens, L. C. Burkly, W.-C. A. Lee, M. E. Greenberg. Sensory experience shapes developing synapses through TWEAK-Fn14 cytokine signaling. *Neuron* (2020).
https://doi.org/10.1016/j.neuron.2020.08.002

RESEARCH EXPERIENCE

High Throughput Electron Microscopy Lab   Nov 2016 – present
PI: Dr. Wei-Chung Allen Lee. *Harvard Medical School, Boston, MA*
- Developed X-ray and electron microscopy (EM) techniques for rapidly mapping the structure of neural circuits, and applied them to study motor control in adult *Drosophila melanogaster*.
- Generated the first connectomic dataset of an adult *Drosophila* ventral nerve cord, and described a monosynaptic reflex arc between the largest-diameter sensory and motor neurons.
- Performed X-ray imaging of an adult *Drosophila* leg to study the sensory receptors underlying proprioceptive input and the motor neurons, muscles, and tendons underlying motor output.

Cellular Quality Control Lab   Summer 2014
PI: Dr. Richard Morimoto. *Northwestern University, Evanston, IL*
- Generated transgenic *C. elegans* with improved survivability in intense heat, aiming to investigate how heat resistance influences lifespan and resistance to neurodegeneration.

Theoretical and Computational Biophysics Group   Summer 2012 & 2013
PI: Dr. Klaus Schulten. *University of Illinois at Urbana-Champaign, IL*
- Performed molecular dynamics simulations of the protein Synaptotagmin-1, aiming to investigate the structural transitions underlying its ability to bend membranes and oligomerize.

Network for Computational Nanotechnology   Jun 2010 – Aug 2011
Advisor: Dr. Nahil Sobh. *University of Illinois at Urbana-Champaign, IL*
- Wrote software for data and image analysis in Java, MATLAB, C#, JavaScript, and Tcl.

Hormonal Modulation of Neuroplasticity Lab   Summer 2009
PI: Dr. Donna Korol. *University of Illinois at Urbana-Champaign, IL*
- Assisted in managing rat colony through handling animals, performing ovary-removal surgeries, and running maze-learning behavioral tasks.

RESEARCH SKILLS

Experimental / data generation
- *Drosophila melanogaster* husbandry, crosses, and nervous system dissections
- Sample preparation for EM (tissue fixation, heavy metal staining, resin embedding)
- Cutting and collecting thin sections of resin-embedded tissue for transmission EM
- Automated section collection and automated transmission EM imaging using GridTape
- Sample preparation for X-ray microscopy
- Imaging neural tissue using synchrotron X-ray beamlines

Software / data analysis
- Python, MATLAB, and Bash; Git and GitHub; Linux and computing clusters
- 2D and 3D elastic image alignment
- Convolutional neural networks for image segmentation

Older skills (before graduate school)
- Microelectrode recordings from neurons (extracellular) and muscles (intracellular)
- *C. elegans* handling; Microinjection for gene delivery in *C. elegans*
- Molecular dynamics simulations
- Programming and data analysis in Java, R, and Tcl
- Rat handling and surgeries

TEACHING AND MENTORING

<u>Teaching assistant for course "Probabilistic Models for Neural Data"</u>   Feb – Mar 2020
Instructor: Dr. Jan Drugowitsch. *Dept. of Neurobiology, Harvard Medical School, Boston, MA*
- Designed and implemented modeling exercises using Jupyter notebooks.
- Assisted students with preparing presentations on modeling theory.

<u>Training and managing research assistants</u>   Jan – Dec 2019
- Designed and implemented a group training program for 8 Northeastern University students working as full-time research assistants in my PhD thesis lab.
- Managed 4 such students working full-time on my projects.

<u>Math fellow for SAGA Innovations</u>   Aug 2015 – Jan 2016
Kelvyn Park High School, Chicago, IL
- Trained in techniques for effective small-group tutoring sessions.
- Served as a math tutor and role model for 10 high school students at risk of dropping out.

<u>Math tutor for the Department of Mathematics</u>   Aug 2011 – May 2015
Washington University in St. Louis, MO
- Organized and led review sessions for groups of 2 to 15 students in 6 different math subjects.
- Hired as a 1-on-1 math tutor by 4 different students.

PRESENTATIONS

J. Maniates-Selvin, L. A. Thomas, W.-C. A. Lee. "Reconstruction of motor control circuits in adult *Drosophila* using automated transmission electron microscopy." Poster presentation at *Max Plank / HHMI Connectomics Conference*. Berlin, Germany. April 2019.

J. Maniates-Selvin, W.-C. A. Lee. "Toward connectomic analysis of sensorimotor circuitry in the adult *Drosophila* ventral nerve cord." Poster presentation at *Neural Circuits of the Insect Ventral Nerve Cord*. Janelia Research Campus, Ashburn, VA. April 2018.

J. Maniates-Selvin, L. Chauve, R. Morimoto. "Production of novel *C. elegans* strains to investigate *hsf-1* functions; Analysis of autism-linked proteins using aggregation propensity calculations." Oral presentation at *Conte Center for Computational Neuropsychiatric Genomics REU Symposium*. The University of Chicago, IL. August 2014.

J. Maniates-Selvin, J. Jacobs, J. Leigh, N. Sobh, U. Ravioli, G. Popescu. "Novel ImageJ plugins for quantitative image analysis." Poster presentation at *Imaging Without Boundaries Conference*. University of Illinois at Urbana-Champaign, IL. October 2010.

HONORS AND AWARDS

Travel Grant from the Harvard Brain Science Initiative	Summer 2018
Community Resource Award from the Harvard Brain Science Initiative	Spring 2018
NSF GRFP Honorable Mention	Spring 2018
College Honors from the College of Arts & Sciences	Spring 2015
National Merit Scholarship	Fall 2011 – Spring 2015

REU Grant from the Chicago Center for Systems Biology   Summer 2014

Dean's List of the College of Arts & Sciences   Spring 2012 – Spring 2014

INVOLVEMENT

Harvard University Table Tennis Club – Coach   Fall 2016 – Present

Graduate Program in Neuroscience – Interview Weekend Lead Organizer   Dec 2016 – Jan 2017

Washington University Table Tennis Club – President & Coach   Fall 2012 – Spring 2015

Washington University Math Club   Spring 2013 – Spring 2015

Washington University Representation Project (Feminism Club)   Fall 2014 – Spring 2015