Matthew Alexander Churgin

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Education

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pennsylvania
Ph.D., Bioengineering
HHMI Interfaces Scholar
GPA (3.96/4.0)
Graduation Date: August 3, 2017

UNIVERSITY OF DELAWARE, Newark, Delaware
B.S., Electrical Engineering
Honors Degree with Distinction
GPA (3.795/4.0)
Graduation date: May 31, 2010

Post-Doctoral Research

Advisor: Benjamin de Bivort, Department of Organismic and Evolutionary Biology, Harvard University (June 2018-Present)

- Utilize paired two-photon imaging and behavioral assays to identify neural loci of individuality in odor and light behavior preference

Advisor: Christopher Fang-Yen, Department of Bioengineering, University of Pennsylvania (June 2017-May 2018)

- Developed robotic imaging system for high-throughput measurements of *C. elegans* healthspan and lifespan

Dissertation Research

"Longitudinal studies of *Caenorhabditis elegans* using a microfabricated multiwell device" (Spring 2012-Spring 2017)
Advisor: Christopher Fang-Yen, Department of Bioengineering, University of Pennsylvania

- Designed a novel long-term cultivation technique to enable monitoring of *C. elegans* lifespan and behavior during development and aging
- Performed forward and reverse genetic screens to search for modulators of developmentally-timed sleep and aging
- Wrote software with graphical user interface to perform real-time image and data analysis

Publications

1. **Churgin, M. A.***, Szuperak, M.*, Davis, K.*, Raizen, D. M., Fang-Yen, C., Kayser, M. S. "Quantitative imaging of sleep behavior in *Caenorhabditis elegans* and larval *Drosophila melanogaster*." Nature Protocols (Accepted Manuscript), *equal contributions
2. Szuperak, M., **Churgin, M. A.**, Borja, A. J., Raizen, D. M., Fang-Yen, C., Kayser, M. S. "A sleep state in *Drosophila* larvae required for neural stem cell proliferation" eLife 2018;7:e33220
3. **Churgin, M. A.**, McCloskey, R., Peters, E., Fang-Yen, C. "Antagonistic serotonergic and octopaminergic neural circuits mediate food-dependent locomotory behavior in *Caenorhabditis elegans*" The Journal of Neuroscience (2017)
4. **Churgin, M. A.**, Jung, S.-K., Yu, C.-C., Chen, X., Raizen, D., Fang-Yen, C. "Longitudinal imaging of *C. elegans* with a microfabricated device reveals variation in behavioral decline during aging." eLife 2017;6:e26652 (2017)
5. McCloskey, R. J., Fouad, A. D., **Churgin, M. A.**, and Fang-Yen, C. "Food Responsiveness Regulates Episodic Behavioral States in *Caenorhabditis elegans*", Journal of Neurophysiology 117, 1911-1934 (2017)
6. Iannacone, M. J., Beets, I., Lopes, L. E., **Churgin, M. A.**, Fang-Yen, C., Nelson, M. D., Schoofs, L., Raizen, D. M. "The RFamide receptor DMSR-1 regulates stress-induced sleep in *C. elegans*." eLife 2017;6:e19837 (2017)

7. Bais, S., **Churgin M. A.**, Fang-Yen C., Greenberg, R. M. "Evidence for novel pharmacological sensitivities of transient receptor potential (TRP) channels in *Schistosoma mansoni*." PLOS Neglected Tropical Diseases (2015).
8. **Churgin M. A.** and Fang-Yen C., "An imaging system for *C. elegans* behavior", in C. elegans, Methods and Applications, G. Haspel and D. Biron, eds., Methods in Molecular Biology 1327: 199-207 (2015)
9. Nelson M. D., Lee K. H., **Churgin M. A.**, Hill A. J., Van Buskirk C., Fang-Yen C., Raizen D. M. "FMRFamide-like FLP-13 neuropeptides promote quiescence following heat stress in *Caenorhabditis elegans*." Curr Biol. 2014 Oct 20;24(20):2406-10.
10. **Churgin M. A.**, He L., Murray J. I., Fang-Yen C. "Construction of a system for single-cell transgene induction in *Caenorhabditis elegans* using a pulsed infrared laser." Methods. 2014 Aug 1;68(3):431-6.
11. **Churgin M. A.**, He L., Murray J. I., and Fang-Yen C. "Efficient single cell transgene induction in *Caenorhabditis elegans* using a pulsed infrared laser." G3: Genes, Genomes, Genetics. October 2013.
12. McMillan C. T., Brun C., Siddiqui S., **Churgin M.**, Libon D., Yushkevich P., Zhang H., Boller A., Gee J., and Grossman M. "White matter imaging contributes to the multimodal diagnosis of frontotemporal lobar degeneration." Neurology May 29, 2012 vol. 78 no. 22

Funding and Awards

- Best Graduate Student Poster Award (2015 International Worm Meeting, Los Angeles, CA)
  - Presented by Genetics Society of America (GSA)
- GAPSA Travel Grant (2012, 2015)
  - Awarded to graduate students travelling to conferences to present their research
- HHMI Interfaces Fellowship (T32, 2010-2012)
  - Awarded to applicants interested in conducting PhD research in biomedical imaging
- AAUP Award (American Association of University Professors) (2010)
  - Awarded to undergraduate students interested in pursuing a career in academia
- Harward Award (2010)
  - Awarded to undergraduates completing a senior thesis to pursue research during winter session

Teaching

- BE301: Signals and Systems, University of Pennsylvania (Fall 2014, Fall 2015)
  - Instructor: Professor Gershon Buchsbaum
  - Organized lectures, review sessions, and office hours in junior level bioengineering course on the theory and practice of signals in a biomedical engineering context
  - Taught engineering concepts including convolution, differential equations, Fourier Series, Fourier Transform, filter design, and sampling theorem
- BE310: Bioengineering Lab II, University of Pennsylvania (Spring 2016)
  - Instructor: Professor David Meaney
  - Mentored students in experimental design, practical troubleshooting, and scientific writing
  - Facilitated three lab projects for junior bioengineers
  - Taught mass transfer concepts for applications in dialysis and pharmacokinetics
  - Oversaw and guided brain-machine interface final project
- ENGR105: Introduction to Scientific Computing, University of Pennsylvania (Spring 2015)
  - Instructor: Dr. Michael Rizk
  - Sophomore-level engineering course introducing the programming language Matlab
  - Met personally with students seeking extra help with basic computer science concepts

Leadership and Outreach

- Mentored four Penn undergraduate students whose work contributed to two peer-reviewed publications (2013-2017)
- Volunteer science project mentor with iPraxis (Fall 2012, Spring 2013, Spring 2014): Mentored 4th and 7th grade students for 8 weeks on science projects
- Project Judge for First Lego League (November 2011)
    - Constructed Lego fields for an event geared towards exciting middle school students about science and engineering
    - Judged and gave feedback on robot projects built by middle school students
- President of Eta Kappa Nu University of Delaware Student Chapter (June 2009-2010).
    - Fostered community engagement through organized meetings, events, mentoring, and tutoring of the following courses: Analog Circuits I, Field Theory I, Microprocessor Systems, Analytic Geometry and Calculus I, II, and III.
- University of Delaware Writing Fellow (Spring 2009-2010).
    - Tutored freshmen to help improve their writing skills in introductory English courses through multiple one on one conferences over the course of one semester