Michael P. O'Donnell

Postdoctoral Fellow, Brandeis University

Education

2006-2012 **Ph.D. in Cell and Molecular Biology**, *University of Pennsylvania*, Philadelphia, PA.

2002 **B.S. in Biomedical Engineering**, *Drexel University*, Philadelphia, PA.

Research Experience

2013 - present **Post-doctoral research**, *Brandeis University*,
Mentor: Piali Sengupta.

- Demonstrated that a bacterially-derived neurotransmitter, tyramine, can modulate olfactory responses and co-opt the function of the host tyraminergic/octopaminergic system.
- Studied the role of feeding state in the integration of sensory inputs during development. Identified a role for intestinal mTORC2 in promoting gut-to-brain signaling.
- Established a microfluidics-based system to study the effects of colonizing microbes on sensory-driven behavior in *C. elegans*. The system allows high-throughput behavioral screening of both bacteria and chemosensory cues.

2006 - 2012 **Doctoral research**, *University of Pennsylvania Medical School*,
Mentor: Greg Bashaw.

- Thesis: Signal transduction mechanisms in commissural axon guidance: The role of intracellular tyrosine kinases in Netrin-DCC/frazzled axon attraction
- Identified roles of multiple intracellular kinases in driving attractive axon guidance decisions in response to the highly conserved guidance cue, Netrin. These kinases couple the Netrin receptor to regulate multiple cytoskeletal events during axon guidance.

2004 - 2006 **Research technician**, *University of Pennsylvania Medical School*,
Mentor: Peter S. Klein.

- Investigated the function of an IGF-receptor interacting protein essential for eye development.
- Studied the role glycogen synthase kinase (GSK3) in regulating the behavioral effects of lithium.

2002 - 2004 **Research technician**, *University of Pennsylvania School of Veterinary Medicine*,
Mentor: Jean-Pierre Saint-Jeannet.

- Identified a feed-forward transcriptional system involving SoxE factors that is essential for long range neural crest cell migration in *Xenopus*.
- Investigated the function of a DMRT-family transcription factor in olfactory neuron specification.

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Publications

Manuscripts

1. **O'Donnell, Michael P.**, BW Fox, PH Chao, FC Schroeder, and P Sengupta (2019). *Modulation of sensory behavior and food choice by an enteric bacteria-produced neurotransmitter*. Preprint. In revision. http://biorxiv.org/lookup/doi/10.1101/735845.

Peer-reviewed primary research

1. **O'Donnell, Michael P.**, PH Chao, JE Kammenga, and P Sengupta (2018). Rictor/TORC2 mediates gut-to-brain signaling in the regulation of phenotypic plasticity in C. elegans. *PLoS Genetics* **14**(2), e1007213.
2. Neal, SJ, A Takeishi, **O'Donnell, Michael P.**, J Park, M Hong, RA Butcher, K Kim, and P Sengupta (Sept. 2015). Feeding state-dependent regulation of developmental plasticity via CaMKI and neuroendocrine signaling. *eLife* **4**.
3. **O'Donnell, Michael P.** and GJ Bashaw (July 2013). Distinct functional domains of the Abelson tyrosine kinase control axon guidance responses to Netrin and Slit to regulate the assembly of neural circuits. *Development* **140**(13), 2724–2733.
4. **O'Donnell, Michael P.** and GJ Bashaw (Jan. 2013). Src inhibits midline axon crossing independent of Frazzled/Deleted in Colorectal Carcinoma (DCC) receptor tyrosine phosphorylation. *The Journal of Neuroscience: The Official Journal of the Society for Neuroscience* **33**(1), 305–314.
5. Garbe, DS, **O'Donnell, Mike**, and GJ Bashaw (Dec. 2007). Cytoplasmic domain requirements for Frazzled-mediated attractive axon turning at the Drosophila midline. *Development* **134**(24), 4325–4334.
6. **O'Donnell, Michael**, CS Hong, X Huang, RJ Delnicki, and JP Saint-Jeannet (Oct. 2006). Functional analysis of Sox8 during neural crest development in Xenopus. *Development* **133**(19), 3817–3826.
7. Wu, J, **O'Donnell, Michael**, AD Gitler, and PS Klein (Sept. 2006). Kermit 2/XGIPC, an IGF1 receptor interacting protein, is required for IGF signaling in Xenopus eye development. *Development* **133**(18), 3651–3660.
8. Huang, X, CS Hong, **O'Donnell, Michael**, and JP Saint-Jeannet (Aug. 2005). The doublesex-related gene, XDmrt4, is required for neurogenesis in the olfactory system. *Proceedings of the National Academy of Sciences of the United States of America* **102**(32), 11349–11354.

Reviews and commentaries

1. **O'Donnell, Michael**, RK Chance, and GJ Bashaw (June 2009). Axon Growth and Guidance: Receptor Regulation and Signal Transduction. *Annual Review of Neuroscience* **32**(1), 383–412.
2. **O'Donnell, Michael P.**, M Khan, and P Sengupta (July 2018). Thermosensation: Human Parasitic Nematodes Use Heat to Hunt Hosts. eng. *Current biology: CB* **28**(14), R795–R798.

My Bibliography https://www.ncbi.nlm.nih.gov/myncbi/1J16Yp6Zdle5w/bibliography/public/

Awards

1997-2002	AJ Drexel Scholarship.
2007-2009	Training program in Cell and Molecular Biology. NIH T32-GM07229
2009–2012	Training program in Developmental Biology. NIH T32-HD007516
2013	Training program in Quantitative Neuroscience. NIH T32-NS-007292
2014-2015	Ruth L. Kirschstein (NRSA) - *Genetic and Neural Basis of Pheromone Sensory Integration in Nematodes.* NIH F32 DC013711

2019 Susan Lindquist Fund award.

Seminars

2015 **International Worm Meeting Quantitative Genetics Workshop, UCLA**, *Natural variation in a TOR-complex 2 component underlies a temperature-dependent polyphenic trait*, Invited seminar.

2017 **International Worm Meeting Pathogen parallel session, UCLA**, *Intestinal colonization by bacteria alters chemosensory responses to alcohols*, Platform presentation.

2017 **Sommer laboratory, Max Planck Institute, Tubingen, Germany**, *TORC2 signaling and gut colonization regulates neuronal state*, Seminar.

2017 **Boston Area Worm Meeting (BAWM), MIT**, *Intestinal mTORC2 and gut colonization regulates internal state*, Seminar.

2018 **Gordon Research Conference on Modulation of Neural Circuits and Behavior, Sunday River, ME**, *Modulation of phenotypic plasticity by gut-brain signaling*, Seminar.

2018 ***C. elegans* Neuro meeting, UW Madison**, *Modulation of aversive chemical responses by tyramine-producing bacteria*, Platform presentation.

2019 **Volen Center for complex systems retreat**, *Modulation of aversive chemical responses by tyramine-producing bacteria*, Invited seminar.

Poster Presentations

2014 **Society for Molecular Biology and Evolution (SMBE) international meeting, San Juan, PR.**, *Opposing peptide signals shape a polyphenic trait in C. elegans.*

2015 **International Worm Meeting, UCLA**, *Rictor limits temperature-dependent dauer formation by controlling intestine-neuron signaling.*

2018 **Gordon Research Conference on Modulation of Neural Circuits and Behavior, Sunday River ME**, *Intestinal colonization by bacteria alters chemosensory avoidance of alcohols.*

Teaching

2007 **Weekly tutoring sessions with 5 first-year graduate students**, *Cell Biology*, Tutor.

2009 **Led a weekly discussion section, contributed to exam writing and grading**, *Gene expression*, TA.

2014 **Lectures on *C elegans* genetics and natural variation, QTL analysis**, *Molecular Genetics*, Guest Lecturer.

2014 **Lectures on evolution of chemosensory receptors**, *Neurogenetics*, Guest Lecturer.

2016 **Lectures on *C elegans* genetics and natural variation, QTL analysis**, *Molecular Genetics*, Guest Lecturer.

2018 **Lectures on evolution of chemosensory receptors**, *Neurogenetics*, Guest Lecturer.

Outreach

2017, 2018 Meet the Scientists program at the Discovery Museum, Acton MA. All ages demonstration

2017 Brandeis Scientist Big Sibling Summer program via the MRSEC REU program. Mentoring non-Brandeis undergraduates

2018 Brandeis Scientists in the classroom workshop.

2019 Brandeis Scientists in the classroom, Morgan King and Nathan Johnson's 7th grade science classes. `https://doi.org/10.6084/m9.figshare.9693464`. McDevitt Middle School, Waltham

Mentoring

Brandeis University **Anna Hartmann, Ph.D., Travis Rogers, Munzareen Khan**, *Sengupta lab doctoral students.*

Brandeis University **Anna Hartmann, Ph.D., Michael Hobin, Daniel Powell, Isa Gell-Levey, Justin Shin**, *Sengupta lab rotation students.*

Brandeis University **Jason Teng**, *Sengupta lab undergaduates.*

Hampton University **David Barnes**, *REU mentees.*

University of Pennsylvania

Celine Santiago, Ph.D., Michael Fleming, Ph.D., Joe Zinksi, Ph.D., *Bashaw lab rotation students.*

References

Piali Sengupta, *Professor and Chair of Biology, Brandeis University*, Shapiro Science Center 2-08A
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Greg J. Bashaw, *Professor of Neuroscience, University of Pennsylvania*, 135A Clinical Research Building
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Yun Zhang, *Professor of Organismic and Evolutionary Biology, Harvard University*, Center for Brain Science
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Frank C. Schroeder, *Professor of Chemistry and Chemical Biology, Cornell University*, Boyce Thompson Institute
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