

Michael P. O'Donnell

POSTDOCTORAL FELLOW

Brandeis University

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Education

University of Pennsylvania

Philadelphia, PA

PH.D. IN CELL AND MOLECULAR BIOLOGY

THESIS: SIGNAL TRANSDUCTION MECHANISMS IN COMMISSURAL AXON GUIDANCE: THE ROLE OF INTRACELLULAR TYROSINE KINASES IN NETRIN-DCC/FRAZZLED AXON ATTRACTION

2012

Drexel University

Philadelphia, PA

B.S. IN BIOMEDICAL ENGINEERING

2002

Positions and Employment

Brandeis University

Mentor: Piali Sengupta

POST-DOCTORAL RESEARCH

2013 - present

- 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**.
- Demonstrated that a bacterially-derived neurotransmitter, tyramine, can modulate olfactory responses and co-opt the function of the host tyraminerigic/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.

University of Pennsylvania Medical School

Mentor: Greg Bashaw

DOCTORAL RESEARCH

2006 - 2012

- 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.

University of Pennsylvania Medical School

Mentor: Peter Klein

PRE-DOCTORAL RESEARCH

2004 - 2006

- 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.

University of Pennsylvania School of Veterinary Medicine

Mentor: Jean-Pierre Saint-Jeannet

PRE-DOCTORAL RESEARCH

2002 - 2004

- 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.

Publications

MANUSCRIPTS

- O'Donnell, Michael P.**, BW Fox, PH Chao, FC Schroeder, and P Sengupta (Aug. 2019). *Modulation of sensory behavior and food choice by an enteric bacteria-produced neurotransmitter*. preprint. Neuroscience. <http://biorxiv.org/lookup/doi/10.1101/735845> (visited on 08/16/2019).

PEER-REVIEWED PRIMARY RESEARCH

- 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*. eng. *PLoS genetics* **14**(2), e1007213.
- 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. eng. *eLife* **4**.
- 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. eng. *Development (Cambridge, England)* **140**(13), 2724–2733.
- 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. eng. *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. eng. *Development (Cambridge, England)* **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. eng. *Development (Cambridge, England)* **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. eng. *Development (Cambridge, England)* **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. eng. *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) - <i>Genetic and Neural Basis of Pheromone Sensory Integration in Nematodes</i>	NIH F32 DC013711
2019	Susan Lindquist Fund award	

Seminars

Natural variation in a TOR-complex 2 component underlies a temperature-dependent polyphenic trait

Invited seminar

INTERNATIONAL WORM MEETING QUANTITATIVE GENETICS WORKSHOP, UCLA

2015

Intestinal colonization by bacteria alters chemosensory responses to alcohols

Platform presentation

INTERNATIONAL WORM MEETING PATHOGEN PARALLEL SESSION, UCLA

2017

TORC2 signaling and gut colonization regulates neuronal state

Seminar

SOMMER LABORATORY, MAX PLANCK INSTITUTE, TUBINGEN, GERMANY

2017

Intestinal mTORC2 and gut colonization regulates internal state.

Seminar

BOSTON AREA WORM MEETING (BAWM), MIT

2017

Modulation of phenotypic plasticity by gut-brain signaling

Seminar

GORDON RESEARCH CONFERENCE ON MODULATION OF NEURAL CIRCUITS AND BEHAVIOR, SUNDAY RIVER, ME

2018

Modulation of aversive chemical responses by tyramine-producing bacteria

Platform presentation

C. elegans NEURO MEETING, UW MADISON

2018

Poster Presentations

Opposing peptide signals shape a polyphenic trait in *C. elegans*

SOCIETY FOR MOLECULAR BIOLOGY AND EVOLUTION (SMBE) INTERNATIONAL MEETING, SAN JUAN, PR.

2014

Rictor limits temperature-dependent dauer formation by controlling intestine-neuron signaling

INTERNATIONAL WORM MEETING, UCLA

2015

Intestinal colonization by bacteria alters chemosensory avoidance of alcohols

GORDON RESEARCH CONFERENCE ON MODULATION OF NEURAL CIRCUITS AND BEHAVIOR, SUNDAY RIVER ME

2018

Teaching

Cell Biology

WEEKLY TUTORING SESSIONS WITH 5 FIRST-YEAR GRADUATE STUDENTS

Tutor

2007

Gene expression

LED A WEEKLY DISCUSSION SECTION, CONTRIBUTED TO EXAM WRITING AND GRADING

TA

2009

Molecular Genetics

LECTURES ON *C. elegans* GENETICS AND NATURAL VARIATION, QTL ANALYSIS

Guest Lecturer

2014

Neurogenetics

LECTURES ON EVOLUTION OF CHEMOSENSORY RECEPTORS

Guest Lecturer

2014

Molecular Genetics

LECTURES ON *C. elegans* GENETICS AND NATURAL VARIATION, QTL ANALYSIS

Guest Lecturer

2016

Neurogenetics

LECTURES ON EVOLUTION OF CHEMOSENSORY RECEPTORS

Guest Lecturer

2018

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

Sengupta lab doctoral students

ANNA HARTMANN, PH.D., TRAVIS ROGERS, MUNZAREEN KHAN

Brandeis University

Sengupta lab rotation students

ANNA HARTMANN, PH.D., MICHAEL HOBIN, DANIEL POWELL, ISA GELL-LEVEY, JUSTIN SHIN

Brandeis University

Sengupta lab undergraduates

JASON TENG

Brandeis University

REU mentees

DAVID BARNES

Hampton University

Bashaw lab rotation students

CELINE SANTIAGO, PH.D., MICHAEL FLEMING, PH.D., JOE ZINKSI, PH.D.

University of Pennsylvania

References

Piali Sengupta

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Greg J. Bashaw

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