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BIOGRAPHICAL SKETCH

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NAME: Hammarlund, Marc

eRA COMMONS USER NAME (credential, e.g., agency login): MARCHAMMARLUND

POSITION TITLE: Assistant Professor of Genetics

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

| INSTITUTION AND LOCATION | DEGREE  (if applicable) | Completion Date  MM/YYYY | FIELD OF STUDY |
| --- | --- | --- | --- |
| Swarthmore College, Swarthmore, PA | B.A | 05/89 | Literature |
| University of Utah, Salt Lake City, UT | Ph.D. | 12/03 | Genetics, spectrin |
| University of Utah, Salt Lake City, UT |  | 12/05 | Synaptic transmission |
| University of Utah, Salt Lake City, UT |  | 06/08 | Neuronal degeneration and regeneration |
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# A. Personal Statement

# I study neuronal regeneration, plasticity, and homeostasis using a genetics and cell-biology approach in the model organism C. elegans. My long-term goal is to understand how neurons and neuronal circuits generate and maintain normal function, to analyze how they regulate their response to injury, disease, and age, and to identify ways to control these processes at the molecular level. My lab uses a broad array of tools, including novel RNAi-based techniques, single-neuron laser surgery and optogenetics. Because C. elegans is transparent and has a simple nervous system, we can manipulate and observe individual neurons in intact, living animals. A major current focus in the lab is understanding the genetics and cell biology of axon regeneration. We have identified several novel regeneration pathways, and are working to link regeneration to functional recovery; to understand how age affects regenerative potential; and to use genetics and genomics to identify additional components of regeneration.

# B. Positions and Honors

Positions and Employment

2008-2015 Assistant Professor, Department of Genetics, Yale University School of Medicine.

2008-present Primary Faculty, Yale Program in Cellular Neuroscience, Neurodegeneration and Repair.

2015-present Associate Professor, Department of Genetics, Yale University School of Medicine (effective 7/1).

Other Experience and Professional Memberships

2008-present Member, Yale Indepartmental Neuroscience Program

2009-present Member, Yale Stem Cell Center.

Honors

1989 B.A. with High Honors, Swarthmore College.

2003 Riser Award for Best Ph.D. Dissertation in Biology, University of Utah.

2008-2010 Kingsley Fellowship in Medical Research.

2008-2011 Yale Scholar in Neuroscience Award.

2009-2011 Beckman Foundation Young Investigator Award.

2010-2014 Ellison Medical Foundation New Scholar Award in Aging

2014-2015 MBL Whitman Fellow

# C. Contribution to Science

1. A major and ongoing project has been to understand the cellular basis of axon regeneration, with the ultimate goals of descibing the process at the molecular level and identifying novel targets for the treatment of nerve injuries. Although axon regeneration had been studied for over a century in a variety of animal models, my work was among the first to develop robust approaches to analyze axon regeneration in the model orgenism C. elegans, and to apply the powerful genetic and cell-biological tools available in this model to the question of axon regeneration. Our publications in this area describe novel injury models, outline the genetic basis for axon regeneration, and identify several novel signaling pathways that regulate axon regeneration, including the DLK MAP kinase pathway, Notch signaling, and signalingfrom theinsulin receptor to to the FOXOA transcription factor. I am the lead or the corresponding author on all this work.
2. Hammarlund, M., Jorgensen, E. M., and Bastiani, M. J. (2007). Axons break in animals lacking β-spectrin. J Cell Biol 176, 269-275. PMCID: PMC1914072.
3. Hammarlund, M., Nix, P., Hauth, L., Jorgensen, E. M., and Bastiani, M. J. (2009) Axon Regeneration Requires A Conserved MAP Kinase Pathway. Science 323, 802-806. PMCID: PMC2729122.
4. El Bejjani, R. and Hammarlund, M. (2012). Notch signaling inhibits axon regeneration. Neuron 73, 268-278. PMCID: PMC3690129.
5. Byrne, A. B., Walradt, T., Gardner, K. E., Hubbert, A., Reinke, V., and Hammarlund, M. (2014). Insulin/IGF1 Signaling Inhibits Age-Dependent Axon Regeneration. Neuron 81, 1-13. PMCID: PMC3924874.
6. Another major goal has been to develop novel tools and approaches that enable the study of new biological questions in *C. elegans.* These tools have been widely adopted by the community. We have also used these tools in our own work to descripe new areas of neuronal cell biology and function. I am the corresponding author on most of this work, and a co-first author on the remaining paper.
7. Davis, M. W., Hammarlund, M., Harrach, T., Hullett, P., Olsen, S., and Jorgensen, E. M. (2005). Rapid single nucleotide polymorphism mapping in *C. elegans*. BMC Genomics 6, 118. PMCID: PMC1242227.
8. Byrne, A. B., Edwards, T. J., and Hammarlund, M. (2011). *In vivo* laser axotomy in *C. elegans*. J Vis Exp. 51, e2707. PMCID: PMC3168200.
9. Firnhaber, C. and Hammarlund, M. (2013). Neuron-specific feeding RNAi in *C. elegans*, and its use in a screen for essential genes required for GABA neuron function. PLoS Genetics 9(11): e1003921. PMCID: PMC3820814.
10. Williams, D. C., El Bejjani, R., Ramirez, P. M., Coakley, S., Kim, S., Lee, H., Wen, Q., Samuel, A., Lu, H., Hilliard, M. A., and Hammarlund, M. (2013). Rapid and permanent neuronal inactivation in vivo via subcellular generation of reactive oxygen using KillerRed. Cell Reports 5, 553-63. PMCID: PMC3877846.
11. RNA ligation has the ability to add to the coding and functional potential of the genome by generating novel RNA species. Although the phenomenon of RNA ligation has long been observed in cell extracts, the RNA ligase itself was only recently identified, and the known targets of this ligase in metazoans were limited to tRNAs. We discovered a novel mRNA target of the metazoan RNA ligase, and also identified a novel function for RNA ligation in regulating the neuronal injury response. Our publications in this area describe these findings and establish new and powerful approaches to studying the mechanism and function of RNA ligation. I am the corresponding author on all of this work.
12. Kosmaczewski, S.G., Edwards, T.J., Han, S.M., Eckwahl, M.J., Meyer, B., Peach, S., Hesselberth, J., Wolin, S.L., and Hammarlund, M. (2014). The RtcB RNA ligase is an essential component of the metazoan unfolded protein response. EMBO Reports 15, 1278-85. PMCID: PMC4264930.
13. Kosmaczewski, S.G., Han, S.M., Han, B., Meyer, B., Baig, H.S., Athar, W., Lin\_moore, A.T., Koelle, M.R., and Hammarlund, M. (2015). RNA ligation in neurons by RtcB inhibits axon regeneration. PNAS 11(27), 8451-6. PMCID: PMC4500288.

## Complete List of Published Work in MyBibliography: <http://www.ncbi.nlm.nih.gov/sites/myncbi/marc.hammarlund.1/bibliography/40735862/public/?sort=date&direction=ascending>