WHITMAN CENTER
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Simon Alford

Position at MBL: PI - MBL Research Award

Institution Contact Information: University of Illinois, Chicago
Biological Sciences
840 West Taylor
Chicago IL 60607

Email: sta@uic.edu
Dates at MBL: 06/01/2015 - 08/15/2015
Room Assignment: R-407

Research Title: Control of the synaptic vesicle pool by endocytic processes
Research Description: Synapses release packets of transmitter from vesicles adjacent to fusion sites in pools defined by their probability of fusion: the readily-releasable, recycling, and reserve pools. After fusion, vesicle membrane is retrieved and proteins are re-sorted into appropriate vesicle pools by paths and mechanisms that remain unknown, but which are vital to neural function and disfunction in neurodegenerative disease. This proposal represents a interdisciplinary collaboration between experts in synaptic physiology and ultrastructure that will invigorate research at MBL and in the PI host institution.

Srdjan Antic

Position at MBL: PI - MBL Research Award

Institution Contact Information: University of Connecticut Health
Neuroscience
263 Farmington Avenue
Farmington CT 06030-3401

Email: antic@uchc.edu
Dates at MBL: 06/23/2015 - 08/11/2015
Room Assignment: R-206

Research Title: Sodium-Calcium Imaging of Glutamate-Mediated Dendritic Spikes
Research Description: Altered excitability of dendrites may exist in a number of neurological conditions. Prior to designing adequate therapies it is necessary to identify membrane mechanisms underlying local dendritic spikes in neurons. The proposed project is collaboration between two laboratories combining an interest in dendrites, new experimental methods and modeling. Simultaneous sodium-calcium dendritic imaging will be used to determine the precise contributions of voltage-gated calcium channels in the generation of dendritic NMDA spikes and plateau potentials. These results will support the discovery of pharmacological compounds capable of increasing or decreasing dendritic spike amplitude or duration, thus alleviating symptoms of cognitive disorders.
Evan Ardiel

Position at MBL: PI - Grass Fellows

Institution Contact Information: University of British Columbia
Neuroscience
2211 Wesbrook Mall
Vancouver BC V6T 2B5

Email: eardiel@yahoo.ca
Dates at MBL: 05/24/2015 - 08/29/2015
Room Assignment: R-201/223

Research Title: All-optical functional connectomics in C. elegans
Research Description: The C. elegans wiring diagram has been available for nearly 30 years, but the functional connections between most neurons remain unknown. I propose an all-optical characterization of the functional connectome using the optogenetic actuator, ChR2, in combination with a red-shifted genetically-encoded calcium indicator, R-CaMP2. The rig setup for this project is simplified by the lack of spectral overlap between ChR2 and R-CaMP2 and cell-specific expression of ChR2, thus allowing for targeted photoactivation with whole field illumination and calcium imaging in multiple postsynaptic partners simultaneously. I propose to fully characterize the synaptic output of a pair of sensory neurons and an interneuron hub.

Peter Armstrong

Position at MBL: PI - Principal Investigator

Institution Contact Information: University of California
Molecular and Cellular Biology
One Shields Ave
Davis California 95616

Email: pbarmstrong@ucdavis.edu
Dates at MBL: 07/01/2015 - 09/15/2015
Room Assignment: L-118

Research Title: Role of the blood clotting system in immunity
Research Description: I will explore the role of the blood clot of select marine invertebrates in the capture and sequestration of microbes and microbial toxins.
Eduardo Arteaga-Bracho

Position at MBL: PI - Grass Fellows

Institution Contact Information: The Dominick P. Purpura Department of Neuroscience
Neuroscience
1410 Pelham Parkway South
Room 401
Bronx NY 10461

Email: eduardo.arteaga-bracho@phd.einstein.yu

Dates at MBL: 05/25/2015 - 08/29/2015

Room Assignment: R 201/223

Research Title: Developmental Impairments in regional neural stem cell niche architecture contributes to regional late-onset pathological cell death in neurodegenerative diseases.

Research Description: The causative mutations for Alzheimer's (AD) and Huntington's (HD) diseases alter developmental pathways that can disrupt embryonic neural stem cell (NSCs) functions. I propose that alterations of discrete NSC niches in HD and AD give rise to differentiated neural cell progeny that are selectively vulnerable to late-life degeneration. In this proposal my hypothesis is NDD gene mutations create selective impairments in the three-dimensional (3D) regionalization and the microdomain structural organization of disease-specific NSC niches. We will generate 3D maps of NSC niches in both AD and HD mouse models during embryogenesis. These studies have the potential to provide previously unanticipated insights into the pathogenesis of NDDs.

George Augustine

Position at MBL: PI - Principal Investigator

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Lee Kong Chian School of Medicine
61 Biopolis Way
Proteos
Singapore Singapore 138673

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Dates at MBL: 06/01/2015 - 08/16/2015

Room Assignment: R-221

Research Title: Molecular mechanisms of neurotransmitter release

Research Description: We use the squid giant synapse to understand the mechanisms that allow nerve cells to communicate with each other.
Barbara Baird
Position at MBL: PI - HHMI Summer Program
Institution Contact Information: Cornell University
Chemistry and Chemical Biology
Baker Laboratory
Ithaca New York 14853-1301

Email: bab13@cornell.edu
Dates at MBL: 06/20/2015 - 08/02/2015
Room Assignment: R-319/320/321

Research Title:
Development and maturation of precerebellar circuits critical for oculomotor learning in zebrafish.
Research Description:
Precerebellar velocity sensitive neurons are located in the hindbrain of all vertebrates to provide an input signal to cerebellar granule cells crucial for the generation of motor learning and memory. Specifically we will study the structural and functional development of eye velocity sensitive neurons in the larval zebrafish. Two photon microscopy will be used to correlate Ca2+ activity (a proxy for neural activity) with the execution of stereotyped eye movement behaviors. We will study the developmental influence of Hox4 paralogs and test the hypothesis that their presence extends the temporal window for neurons to differentiate and exhibit velocity sensitivity.

Robert Baker
Position at MBL: PI - Principal Investigator
Institution Contact Information: NYU Medical Center
Neuroscience and Physiology
550 First Ave
New York NY 10016

Email: robert.baker@nyumc.org
Dates at MBL: 06/01/2015 - 09/30/2015
Room Assignment: R-220

Research Title: Development and maturation of precerebellar circuits critical for oculomotor learning in zebrafish.
Research Description: Precerebellar velocity sensitive neurons are located in the hindbrain of all vertebrates to provide an input signal to cerebellar granule cells crucial for the generation of motor learning and memory. Specifically we will study the structural and functional development of eye velocity sensitive neurons in the larval zebrafish. Two photon microscopy will be used to correlate Ca2+ activity (a proxy for neural activity) with the execution of stereotyped eye movement behaviors. We will study the developmental influence of Hox4 paralogs and test the hypothesis that their presence extends the temporal window for neurons to differentiate and exhibit velocity sensitivity.
Michael Bennett

Position at MBL: PI - Principal Investigator

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Neuroscience
1300 Morris Park Ave
Bronx NY 10461

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Dates at MBL: 06/15/2015 - 09/30/2015

Room Assignment: R-213

Research Title: Evolution of electrical coupling

Research Description: Electrical coupling via gap junctions evolved at least twice. In vertebrates, gap junctions are formed by connexins, a family of ~20 genes. Connexins first appear in ascidians. In protostomes gap junctions are formed by pannexins/innexins, a gene family expressed in Coelenterates, Cniderians, and protostomes. Pannexins are also expressed in Branchiostomes, ascidians, and vertebrates. In vertebrates, endogenous pannexins are not known to form gap junctions but do form hemichannels that directly connect cell cytoplasm and external milieu. Neither connexins or pannexins are expressed in echinoderms or in a primitive eukaryote, Tricoplax. We hope to find a collaborator to examine coupling in Arbacia, Brachiostoma, Saccoglossus and Tricoplax.

Magdalena Bezanilla

Position at MBL: PI - MBL Research Award

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Biology
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611 N. Pleasant Street
Amherst MA 01003

Email: bezanilla@bio.umass.edu

Dates at MBL: 06/28/2015 - 08/26/2015

Room Assignment: L-104/105

Research Title: Microfluidics devices functioning as micro-barriers provide a novel single-cell re-polarization assay

Research Description: In this project we will work with moss, a simple, genetically tractable plant model system. We have shown that moss can grow in microfluidic devices and now we have designed these devices to provide a number of complex geometries that the moss must navigate around. By navigating around obstacles, the site of polarization changes and we can begin to time molecular events that accompany cell growth. These studies will address fundamental cell biological questions pertaining to polarized growth.
David Bodznick

Position at MBL: PI - Principal Investigator

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Biology
52 Lawn Ave
Middletown CT 06459

Email: dbodznick@wesleyan.edu

Dates at MBL: 05/15/2015 - 09/15/2015
Room Assignment: R-211

Research Title: Granule processing in the cerebellum-like sensory nucleus of skate
Research Description: We will use electrophysiological recordings to determine the ways in which copies of motor commands and sensory signals are combined or subdivided to yield the necessary predictive signals used by the fish to anticipate the sensory consequences of its own behaviors.

Scott Brady

Position at MBL: PI - Principal Investigator

Institution Contact Information: UIC
Anatomy and Cell Biology
808 S Wood St CME 578 MC512
Chicago IL 60612

Email: stbrady@uic.edu

Dates at MBL: 06/01/2015 - 08/31/2015
Room Assignment: R-108

Research Title: Molecular Mechanisms of Axonal Transport and Neurodegeneration
Research Description: Neuronal growth, maintenance and regeneration are critically dependent on delivery of materials from cell body to the nerve fiber and terminal. Motor proteins that were first described at the MBL using the squid as a model organism mediate this process, known as fast axonal transport. We use the giant axon of the squid and digital video microscopy to study how these motor proteins work and how they are regulated in neurons. These studies are important for understanding the basic biology of the neuron and have provided important insights into molecular mechanisms underlying neurodegenerative diseases like motor neuron disease as well as Huntington's, Alzheimer's and Parkinson's disease.
Clifford Brangwynne

Position at MBL: PI - HHMI Summer Program

Institution Contact Information: Princeton University
Department of Chemical and Biological Engineering
301 Hoyt Laboratory
William Street
Princeton NJ 08525

Email: cbrangwy@princeton.edu
Dates at MBL: 08/03/2015 - 08/15/2015
Room Assignment: R-319/320/321

Research Title: Biophysical Properties of Model Phase Separated Droplet
Research Description: We are working to elucidate the link between molecular binding interactions and large scale biophysical properties of a model organelle.

David Burgess

Position at MBL: PI - Principal Investigator

Institution Contact Information: Boston College
Biology
Higgins Hall
140 Commonwealth Ave
Chestnut Hill MA 02467

Email: david.burgess@bc.edu
Dates at MBL: 06/01/2015 - 09/01/2015
Room Assignment: L-223

Research Title: Regulation of contractile ring shape
Research Description: We will study how the contractile ring of dividing cells, responsible for dividing the cell in half after mitosis, in early embryos.
Diany Calderon
Position at MBL: PI - Grass Fellows
Institution Contact Information: The Rockefeller University
Neruobiology and behavior
1230 York Ave. Box 275
New York New York 10065

Email: dcalderon@rockefeller.edu
Dates at MBL: 05/25/2015 - 08/29/2015 Room Assignment: R-201/223
Research Title: Contribution of arousal pathways and local inhibition in gigantocellular area to induce wakefulness
Research Description: Significant decreases in arousal such as in coma are associated with global suppression of brain activity. However, it is not clear whether this global suppression can be reversed by activating any small subset of neurons. Our first study determined that pharmacologic disinhibition or optogenetic stimulation of glutamatergic cells within the brainstem (gigantocellular area-GA) produces cortical, autonomic and behavioral arousal while animal is deeply anesthetized. Here I propose that this subset of neurons is also able to coordinate activation of many arousal pathways to promote wakefulness. I will investigate the contribution of arousal pathways to induce cortical activation via GA activation and the role of local inhibition to modulate GA activity. Findings may postulate GA as a site for neuromodulation to restore cortical activity in disorders of consciousness.

Fred Chang
Position at MBL: PI - Principal Investigator
Institution Contact Information: Columbia University
Microbiology and Immunology
701 168th St.
New York New York 10032

Email: fc99@columbia.edu
Dates at MBL: 07/02/2015 - 08/16/2015 Room Assignment: L-223
Research Title: Regulation of Cell Size
Research Description: The organization of cellular components into cells of a specified size and shape are fundamental processes governing life. In cells that are actively growing and dividing, cell size can be maintained by mechanisms that ensure that cells divide only after they grow to be a certain size. We have recently identified a putative sizer that monitors cell size in fission yeast. Using live cell microscopy, we will investigate the dynamic properties of this protein to investigate how it may form node structures on the plasma membrane to sense cell size.
Lawrence Cohen

Position at MBL: PI - Principal Investigator

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Physiology
333 Cedar St.
New Haven CT 06510

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Dates at MBL: 06/01/2015 - 09/05/2015
Room Assignment: R-210

Research Title: Optical Studies of Neuron Activity and Organization

Research Description: Analysis of data from 2-photon microscope measurements of neuron activity in the olfactory bulb and piriform cortex in response to activating an individual glomerulus.

Sean Colin

Position at MBL: PI - MBL Research Award

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Marine Biology and Environmental Science
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Bristol Rhode 02809

Email: scolin@rwu.edu

Dates at MBL: 06/20/2015 - 08/31/2015
Room Assignment: R-301

Research Title: Fluid mechanical basis of universal natural propulsor bending patterns

Research Description: If you have ever noticed flying birds or swimming fish you might have seen that their wings and fins always bend as they move. Scientists do not understand the advantages that bending wings and fins provide for flight or swimming. Our goal is to look at how animals use body bends in order to swim. In order to do this we will track water motions around swimming animals in 3D. This will provide us with critical information to understand why bending propulsors are better than rigid ones.
Daniel Colon-Ramos
Position at MBL: PI - Principal Investigator

Institution Contact Information: Yale University
Department of Cell Biology
295 Congress Avenue
New Haven CT 06511

Email: daniel.colon-ramos@yale.edu
Dates at MBL: 07/19/2015 - 08/16/2015
Room Assignment: L-219

Research Title: Research
Description:

John Costello
Position at MBL: PI - MBL Research Award

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Biology Department
1 Cunningham Sq
Providence RI 02918-0001

Email: costello@providence.edu
Dates at MBL: 06/20/2015 - 08/30/2015
Room Assignment: R-301

Research Title: Fluid mechanical basis of universal natural propulsor bending patterns
Research Description: We will use empirical analyses of animal kinematics and fluid dynamic consequences to determine how bending controls thrust and maneuverability. Based on this understanding we will derive essential patterns that can be tested for broader occurrence throughout the animal kingdom. Our research objectives are designed to identify the relationship between bending kinematics and force generation to test the general hypothesis that the magnitude and position of propulsor bends predictably determine propulsive forces. Equally as important, we will evaluate the hydrodynamic mechanisms by which bending propulsors generate thrust.
Michael Dustin

Position at MBL: PI - HHMI Summer Program

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Headington Oxon OX3 7FY

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Dates at MBL: 06/22/2015 - 08/01/2015
Room Assignment: R-319/320/321

Research Title: 
Research Description:

Amy Finkelstein

Position at MBL: PI - Principal Investigator

Institution Contact Information: MIT
Department of Economics
52 Memorial Drive
Cambridge MA 02139

Email: afink@mit.edu

Dates at MBL: 06/29/2015 - 08/14/2015
Room Assignment: Lillie 10

Research Title: 
Research Description:
**Drew Friedmann**

**Position at MBL:** PI - Grass Fellows

**Institution Contact Information:** UC Berkeley  
Molecular and Cell Biology  
279 Life Sciences Addition  
Berkeley CA 94720

**Email:** df@berkeley.edu  
**Dates at MBL:** 05/25/2015 - 08/29/2015  
**Room Assignment:** R-201/223

**Research Title:** Mechanisms for developmental regulation by a nonvisual opsin

**Research Description:** Though most animals sense light in structures specialized for vision, many opsins exist outside the eye. In translucent zebrafish, activation of vertebrate ancient long opsin a (VALopA) within the spinal central pattern generator profoundly inhibits spontaneous neural activity and motor behavior. However, it is not known which specific cells are photosensitive or how the inhibition propagates through the circuit. Here, I propose recording from active pacemakers, interneurons, motor neurons, and precursors in order to better understand the mechanism of action of VALopA. Investigating acute responses to light and changes effected by sustained illumination will be informative for understanding zebrafish behavior and for establishing a new role for a nonvisual opsin in regulating development.

**J. Furlow**

**Position at MBL:** PI - MBL Research Award

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Neurobiology, Physiology and Behavior  
One Shields Avenue  
Davis CA 95616

**Email:** jdfurlow@ucdavis.edu  
**Dates at MBL:** 06/21/2015 - 08/02/2015  
**Room Assignment:** R-424

**Research Title:** Continued in vivo analysis of thyroid hormone receptor signaling during development using emerging genetic technologies in Xenopus laevis

**Research Description:** We study how thyroid hormone, the same molecule that regulates brain development and metabolism in humans, regulates amphibian metamorphosis, one of the most dramatic hormonal effects in nature. As the tadpole becomes a frog, the hormone induces tail loss, limb growth, remodeling of the brain and many others. Our studies focus on how specific thyroid hormone receptor types govern these varied responses by regulating specific genes. We also study the effect of environmental chemicals (flame retardants, PCBs, and others) that alter the activity of these receptors during development. Our research is focused on the basics of thyroid hormone action during development, with clear applications to the clinic and environmental toxicology.
David Gadsby

Position at MBL: PI - Principal Investigator

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Lab Cardiac/Membrane Physiology
1230 York Ave
New York NY 10065

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Dates at MBL: 05/03/2015 - 09/30/2015
Room Assignment: L-121

Research Title: Mechanism and structure of the Na/K-ATPase ion pump
Research Description:
All animal cells contain many copies of the sodium/potassium pump, which expends ATP to expel sodium from the cell while taking in potassium. The resulting gradients of sodium and potassium concentration are used for many essential processes vital for cell life. Despite half a century of study, we still do not know exactly how these remarkable microscopic machines carry out their incessant, painstaking work. By examining details of the behavior of normal, native sodium/potassium pumps, and comparing them with those of pumps in which we have changed a single amino-acid building block, we are filling in the gaps in this puzzle.

Jesse Gatlin

Position at MBL: PI - MBL Research Award

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Molecular Biology
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CB 3944
Laramie Wyoming 82071

Email: jgatlin@uwyo.edu

Dates at MBL: 06/15/2015 - 08/17/2015
Room Assignment: L-225/226

Research Title: Investigating Mitotic Spindle Assembly Using Microfluidic Devices and Cell-mimetic Droplets
Research Description:
The proposed research will combine Xenopus egg extracts with microfluidic technologies to study mitotic spindle assembly and positioning. This interdisciplinary project will bring together a research team with individual expertise in biochemistry, cell biology, and chemical engineering. In addition to making fundamental and vertical advances in our understanding of these fundamental cell biology processes, the technologies developed will (i) greatly increase the utility of an already powerful model system and (ii) will likely find broader application in diverse fields including tissue engineering and cancer diagnostics.
Daniel Gerlich

Position at MBL: PI - Principal Investigator

Institution Contact Information: IMBA, Institute of Molecular Biotechnology

Dr. Bohr Gasse 3
Vienna Vienna 1030

Email: daniel.gerlich@imba.oeaw.ac.at

Dates at MBL: 06/09/2015 - 08/18/2015

Research Title: Mechanisms of mitotic spindle assembly: electron tomography and lattice light sheet microscopy approaches

Research Description: We aim to understand how distinct functional classes of mitotic spindle microtubules form, and how they are organized at different stages of mitosis. Using high-pressure freezing, electron tomography, and automated microtubule tracking, we aim to reconstruct spindles in the surf clam Spisula and in human tissue culture cells (collaboration with T. Mueller Reichert and with R. Oldenbourg). We further aim to visualize spindle assembly in live cells at single microtubule resolution. We have acquired ultra-fast 3D movies using lattice light sheet microscopy (collaboration with E. Betzig), which we aim to statistically analyze at MBL by microtubule plus-tip tracking (collaboration with G. Danuser).

Andrew Gillis

Position at MBL: PI - Principal Investigator

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Zoology
Downing Street
Cambridge Cambridges CB2 3EJ

Email: jag93@cam.ac.uk

Dates at MBL: 06/01/2015 - 08/15/2015

Research Title: Gill arch serial homology and the origin of the jawed vertebrate body plan

Research Description: Over a century ago, the comparative anatomist Carl Gegenbaur hypothesized that the jaws and paired fins of vertebrates were both derived from modified gill arches. These hypotheses of serial homology were based largely on the primitive endoskeletal anatomy of chondrichthyan fishes (e.g. sharks and skates), but remain effectively untested, owing to a lack of molecular developmental data from this group. My research investigates and compares the molecular patterning of jaws, gill arches and paired appendages in embryos of a chondrichthyan, the skate Leucoraja erinacea, in order to test the hypothesis that these structures are built upon a common molecular blueprint.
Amy Gladfelter

Position at MBL: PI - Principal Investigator

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Biological Sciences
6044 Life Sciences Center
Hanover NH 03755

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Dates at MBL: 06/20/2015 - 08/10/2015 Room Assignment: Lillie 219

Research Title: Septins are conserved, membrane-associated cytoskeletal elements important for cytokinesis. We will be working closely with Tomomi Tani and Rudolf Oldenbourg to analyze septin filament assembly and dynamics using polarized fluorescence microscopy.

Robert Goldman

Position at MBL: PI - Principal Investigator

Institution Contact Information: Northwestern University, Feinberg School of Medicine
Cell and Molecular Biology
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Ward Building 11-145
Chicago IL 60611

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Dates at MBL: 06/08/2015 - 08/28/2015 Room Assignment: R-305/307

Research Title: Nuclear Lamins -- Structure and Function in Nuclei and Meiotic Spindles
Research Description: We are studying the structure and function of nuclear lamins. These are nuclear skeletal proteins.
Jose Luis Gomez-Skarmeta

Position at MBL: PI - MBL Research Award

Institution Contact Information: Centro Andaluz de Biologia del Desarrollo
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Carretera de Utrera Km1
Seville Seville 41013

Email: jlgomska@upo.es

Dates at MBL: 07/01/2015 - 09/06/2015

Research Title: Identification and functional analysis of cis-regulatory elements required for the highly specialized morphology of skate fins

Research Description: The evolution of animal morphology depends on changes in cis-regulatory elements (CRE) controlling the expression of developmental genes required for body plan formation. Here, we will use a multidisciplinary approach to identify, and functionally analyze, CREs required for the highly specialized morphology of skate fins. We will first map open chromatin and transcription factors footprints to identify skate-associated CREs regions. We will then determine genes controlled by these CREs and functionally examine their activity. Finally, we will test if these skate-associated CREs can promote skate-like fins in zebrafish, to experimentally recapitulate key evolutionary events in the lab.

Pierre Gonczy

Position at MBL: PI - MBL Research Award

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School of Life Sciences
Station 19
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Dates at MBL: 06/25/2015 - 08/07/2015

Research Title: Mechanisms of centriole elimination in starfish oocytes

Research Description: Centrioles are small organelles that are critical for a number of fundamental processes with cells, including their polarity, their migration and their division. Centrioles usually duplicate once per cell cycle, but this rule is broken at fertilization: in this case, the maternally contributed centrioles are typically eliminated or rendered non-functional, whereas the paternally contributed centrioles persist in the zygote. We plan to investigate these mechanisms using starfish oocytes as a model system. We anticipate that our work at MBL will provide important entry points into the mechanisms of centriole elimination that prevail in the female germ line across metazoan evolution.
Gary Gorbsky

**Position at MBL:** PI - MBL Research Award

**Institution Contact Information:**
Oklahoma Medical Research Foundation
Cell Cycle & Cancer Biology
825 NE 13th ST
MS 48
Oklahoma City OK 73104

**Email:** GJG@omrf.org

**Dates at MBL:** 06/21/2015 - 08/30/2015  
**Room Assignment:** R-205

**Research Title:** Gene editing in Xenopus cell lines

**Research Description:** This project will develop novel permanent cell lines in Xenopus tropicalis and Xenopus laevis. These lines will be used for gene editing with CRISPR-Cas9 technology. Nuclei from edited cell lines will be introduced into enucleated eggs to create mutant Xenopus in a single generation. The study will be done in collaboration with Dr. Marko Horb at the National Xenopus Resource. Cell lines will allow specific mutations to be precisely generated, mapped and characterized before they are introduced into animals. The potential to produce mutants in one generation through nuclear transfer promises a quantum leap in streamlining mutant studies in Xenopus.

Gohta Goshima

**Position at MBL:** PI - MBL Research Award

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**Dates at MBL:** 07/14/2015 - 08/23/2015  
**Room Assignment:** L-104/105

**Research Title:** Reconstitution of kinetochore microtubule dynamics

**Research Description:** Regulation of microtubule dynamics is critical for cell division. However, the underlying mechanism is still poorly understood, as the dynamics have not been faithfully reconstituted. In this research, in a collaboration of four different labs, we aim to reconstitute polymerisation dynamics and the cross-linking of kinetochore-associated microtubules in vitro and in silico. Several purified proteins, including a microcephaly-linked protein, will be mixed with microtubules, and microtubule behaviour will be observed using light microscopy or modelling. The success of this research would provide insight into molecular mechanisms underlying kinetochore microtubule dynamics and human pathology.
Philip Grant

Position at MBL: PI - Principal Investigator

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Bethesda MD 02892

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Dates at MBL: 07/01/2015 - 09/12/2015 Room Assignment: R-326

Research Title: Role of cdk5 kinase in development and function of the squid giant fiber system

Research Description: Cdk5 kinase phosphorylates neuronal proteins during development and function of the mammalian nervous system. When deregulated, it contributes to the pathology of neurodegeneration. We study the role of the kinase in development of the squid giant fiber system to understand the molecular basis of its regulation and deregulation in neurodegeneration.

Jessica Gray

Position at MBL: PI - MBL Research Award

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Systems Biology
200 Longwood Avenue
Boston MA 02115

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Dates at MBL: 05/01/15 - 05/31/15 & 09/01/15 - 09/30/15 Room Assignment: R-109

Research Title: Investigating the role of miR-124 in nervous system evolution

Research Description: How animals evolved many of the complex morphological characteristics we see today remains a mystery. One likely answer involves changes in the regulation of signaling pathways and gene expression during animal development &amp; using conserved pathways in different times and places to produce different characteristics. My work focuses on a class of small noncoding RNAs (called microRNAs) that negatively regulate gene expression in development and are potentially potent regulators of gene network evolution. Specifically I am looking at the evolutionary role of microRNA regulation in neural development by studying the function of ancestral microRNAs in an invertebrate animal, the hemichordate, which shares a common ancestor with vertebrates.
William Green
Position at MBL: PI - Principal Investigator
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Neurobiology
924 East 58th Street
Chicago IL 60637

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Dates at MBL: 06/21/2015 - 08/08/2015
Room Assignment: R-407

Jay Groves
Position at MBL: PI - HHMI Summer Program
Institution Contact Information: UC Berkeley
Chemistry
408A Stanley Hall
Berkeley CA 94720

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Dates at MBL: 06/20/2015 - 08/02/2015
Room Assignment: R-319/20/321
Melina Hale

**Position at MBL:** PI - Collaboration Award

**Institution Contact Information:**

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Organismal Biology and Anatomy  
1027 E. 57th St.  
Chicago IL 60637

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**Dates at MBL:** 07/10/2015 - 07/18/2015  
**Room Assignment:** R-407

**Research Title:** Evolution of the Mauthner Cell in Fishes  
**Research Description:**

The startle response occurs in nearly all vertebrates and is fundamental for survival. Startle circuit neurons are distinctive, particularly the giant pair of Mauthner cells (M-cells) that initiate startle behavior. Unlike other vertebrate circuits, the M-cells and other large reticulospinal neurons can be homologized at the individual cell level, making it possible to examine how a single, specific brain neuron has changed over time, rather that relying on region or population-level analysis of homology. Our goals are to determine how the M-cell and startle circuit changed through evolution and to use this system as a case study for understanding vertebrate circuit evolution more broadly.

Marc Hammarlund

**Position at MBL:** PI - MBL Research Award

**Institution Contact Information:**

Yale University  
Genetics and CNNR  
295 Congress Ave., BCMM Room 4  
New Haven Connecticut 06510

**Email:** marc.hammarlund@yale.edu  
**Dates at MBL:** 06/21/2015 - 08/31/2015  
**Room Assignment:** R-308

**Research Title:** Mechanisms of Neuronal Circuit Homeostasis  
**Research Description:**

How consistent function of neural circuits is regulated across billions of individuals is not well understood. Defects in such homeostatic mechanisms could result in circuit dysfunction and medically-relevant behavioral abnormalities. Here, I propose a completely novel approach to studying the mechanisms of circuit-level neuronal homeostasis. By leveraging the stereotyped architecture of the C. elegans nervous system, I will analyze how nervous systems adjust themselves when challenged by extra neurons, and perform a forward genetic screen to identify mechanisms that mediate neuronal circuit homeostasis. This project takes advantage of the collaborative environment at the MBL.
Avram Hershko

Position at MBL: PI - Principal Investigator

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1 Efron Street
Haifa Israel 31096

Email: hershko@tx.technion.ac.il

Dates at MBL: 07/05/2015 - 09/05/2015 Room Assignment: R-311

Research Title: Control of cell division by protein degradation.
Research Description: Cell division is driven by oscillation in levels of regulatory proteins, such as cyclins. The programmed degradation of these regulatory proteins is responsible for progress into the next phase of the cell division cycle. We are investigating the molecular mechanisms of the degradation of cell cycle regulatory proteins.

David Holowka

Position at MBL: PI - HHMI Summer Program

Institution Contact Information: Cornell University
Chemistry and Chemical Biology
Baker Laboratory
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Email: dah24@cornell.edu

Dates at MBL: 06/20/2015 - 08/02/2015 Room Assignment: R-319/320/321

Research Title: Control of cell division by protein degradation.
Research Description:
Elizabeth Jonas

Position at MBL: PI - Principal Investigator

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Internal Medicine
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New Haven CT 06517

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Dates at MBL: 06/15/2015 - 09/15/2015
Room Assignment: R-213

Research Title: Mitochondrial ion channels in synaptic transmission
Research Description: Mitochondria produce energy in the form of ATP. This is a regulated process. Mitochondrial inner membrane and outer membrane contain different ion channels. We record the ion channel activity of mitochondria to determine the role of these channels in neuronal death and synaptic strengthening.

Erik Jorgensen

Position at MBL: PI - Lillie Award

Institution Contact Information: University of Utah/HHMI
Biology
257 S 1400 E
Rm 201
Salt Lake City UT 84112

Email: jorgensen@biology.utah.edu

Dates at MBL: 07/01/2015 - 08/01/2015
Room Assignment: L-216/217

Research Title: Ultrafast endocytosis of AMPA receptors during long-term synaptic depression
Research Description: This is a joint project between the Jorgensen and Rosenmund labs to use novel electron microscopy imaging techniques to investigate the cellular and molecular mechanisms underlying synaptic plasticity. The funds support two to three summers of interdisciplinary pilot research on site at the Marine Biological Laboratory.
Leonard Kaczmarek

Position at MBL: PI - Principal Investigator

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Email: leonard.kaczmarek@yale.edu
Dates at MBL: 06/19/2015 - 09/14/2015
Room Assignment: R-213

Research Title: Role of BCL-2 proteins in synaptic transmission
Research Description: A protein called Bcl-xL is found to be present at high levels in the adult brain. A well-established role for this protein is to protect cells from cell death, by controlling the movement of protein from mitochondria into the cytoplasm. Experiments carried out in collaboration with Dr. Elizabeth Jonas have demonstrated that this protein also controls the normal transmission of information across neuronal synapses.

Rolf Karlstrom

Position at MBL: PI - MBL Research Award

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Biology
611 N. Pleasant
Amherst MA 01003

Email: karlstrom@bio.umass.edu
Dates at MBL: 07/06/2015 - 08/23/2015
Room Assignment: R-406

Research Title: Zebrafish Spinal Cord Regeneration
Research Description: Unlike humans, fish have the remarkable ability to recover neural function following spinal lesion, making them an excellent model for understanding genetic programs that promote neural regeneration. This collaborative project with Dr. Morgan of the MBL will develop zebrafish tools to test the function of regeneration-associated genes that were identified in the lamprey. Our goal is to develop a new in vivo test of gene function during regeneration that would ideally contribute to efforts aimed at restoring neural function in the estimated ~300,000 Americans who are living with spinal cord injury (SCI).
U. Benjamin  Kaupp

Position at MBL:  PI - Principal Investigator

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Molecular Sensory Systems
Ludwig-Erhard-Allee 2
Bonn NRW 53175

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Dates at MBL:  06/01/2015  -  09/30/2015  Room Assignment:  R-312

Research Title:  Chemotactic signaling pathway in sea urchin sperm
Research Description:

Darcy  Kelley

Position at MBL:  PI - MBL Research Award

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Biological Sciences
MC2432
1212 Amsterdam Ave
New York New York 10027

Email:  dbk3@columbia.edu

Dates at MBL:  07/12/2015  -  08/12/2015  Room Assignment:  R-205

Research Title:  Molecular Neurobiology of Sexually Differentiated Vocal Patterns
Research Description:  Interconnected groups of neurons form the neural circuits that underlie essential functions of the nervous system. Our goal is to understand the function of neural circuits that produce different vocal patterns, determine how those patterns become different in the sexes, and gain insight into the relation between those circuits and their evolutionary precursors that shape respiration. The isolated brain of Xenopus can produce fictive calls that match patterns of nerve activity during actual courtship songs. We will drive the activity of identified neural populations to determine how neurons that are sensitive to the hormones required for vocal patterns participate in sex-specific neural circuits for behavior.
Kamran Khodakhah

Position at MBL: PI - Grass Fellows

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Neuroscience
1410 Pelham parkway S
Bronx NY 10461

Email: k.khodakhah@einstein.yu.edu

Dates at MBL: 05/16/2015 - 09/06/2015

Room Assignment: R201/223

Research Title: Cerebello-basal ganglia interactions: Cerebellar modulation of substantia nigra

Research Description: The basal ganglia and cerebellum are two subcortical structures with recognized roles in movement and cognition. It has recently been demonstrated that the connections between the cerebellum and different nuclei in the basal ganglia are much more extensive than previously understood and could mediate interactions between these structures independent of the cortex. Understanding how the cerebellum and basal ganglia interact is necessary to understanding how movements are generated and controlled in the brain and how dysfunction of these structures leads to a number of motor disorders. The present study seeks to understand the functional connection between the cerebellum and the substantia nigra.

Matthew Kittelberger

Position at MBL: PI - Grass Fellows

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Dept. of Biology
300 N. Washington St.
Gettysburg PA 17325

Email: mkittelb@gettysburg.edu

Dates at MBL: 05/20/2015 - 08/30/2015

Room Assignment: R201/223

Research Title: Catecholamine modulation of vocal circuit function in a teleost fish

Research Description: Previous work in my lab has shown that dopamine rapidly and reversibly inhibits vocal production in midshipman fish, a highly vocal species of toadfish. This is consistent with the hypothesis that DA release, triggered by the arrival of a gravid female in the nest of a courting male, causes males to cease courtship vocalizations and initiate copulatory behavior. I will explore the role of catecholamines in modulating midshipman social vocal behavior, by a) charting which populations of catecholamine neurons innervate the midshipman vocal circuit, and b) determining the behavioral contexts (social, vocal, auditory, etc) in which catecholamine neurons are active, using immediate-early genes.
Tatjana Kleele

Position at MBL: PI - Grass Fellows

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Institute of Neuronal Cell Biology
Biedersteinerstr. 29
Munich Bavaria 80802

Email: Tatjana.Kleele@lrz.tum.de

Dates at MBL: 05/24/2015 - 08/30/2015

Research Title: The role of the cytoskeleton in mouse models of spinal muscular atrophy

Research Description: Spinal muscular atrophy (SMA) is a genetic disorder characterized by a loss of spinal motor neurons. Patients carry a mutation in the SMN1 gene leading to low levels of the SMN protein. To better understand the cellular mechanism by which a lack of SMN protein leads to selective loss of motor neurons, I will study the role of the neuronal cytoskeleton in SMA mouse models. Firstly I want to investigate alterations in microtubule dynamics by time-lapse in vivo imaging of motor axons from SMA mice crossed to mice, which express EB3-YFP - a marker for dynamic microtubules. Secondly I will establish a new imaging tool based on fluorescent actin markers to study alterations of actin dynamics in SMA. If the cytoskeleton is indeed destabilized in SMA mice, a pharmacological treatment with microtubule stabilizing drugs will be used to test if there is a beneficial effect on disease progression.

Kristen Koenig

Position at MBL: PI - Grass Fellows

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Molecular Biosciences
2401 Speedway
PAT 208
Austin TX 78712

Email: kmkoenig@utexas.edu

Dates at MBL: 05/25/2015 - 08/29/2015

Research Title: Neurodevelopment in the Cephalopod Loligo pealeii: Complex-Eye Morphogenesis

Research Description: 
Abhishek Kumar

Position at MBL: PI - Grass Fellows

Institution Contact Information: Yale University
Department of Cell Biology
295 Congress Avenue
BCMM 436B
New Haven CT 06510

Email: abhishek.kumar@yale.edu
Dates at MBL: 05/25/2015 - 08/29/2015
Room Assignment: R-201/223

Research Title: Determining how the Lateral Nerve Cord Forms in Live C. elegans Embryos using Light Sheet Microscopy and Optogenetics

Research Description: One of the major goals of developmental neurobiology is to examine how complex neural circuits form and to understand the mechanisms directing precise spatial and temporal growth in these circuits. One important question within this broader field to be addressed is: How do structures containing multiple neurons fasciculate? I propose to investigate the development and growth of the C. elegans lateral nerve cord (which comprises CAN, ALA and BDU neurons and the excretory canal cell) in live embryos. I will employ light sheet microscopy paired with cell-specific promoters to investigate the migration and outgrowth of lateral nerve cord neurons during embryogenesis. Based on the timing and position of the observed migration and outgrowth events, I will build a 4D map that describes the contribution of each cell to the development of the lateral nerve cord as a whole.

Patrick La Riviere

Position at MBL: PI - Collaboration Award

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Radiology
5841 S Maryland Ave, MC-2026
Chicago IL 60637

Email: pjlarivi@uchicago.edu
Dates at MBL: 06/27/2015 - 07/25/2015
Room Assignment: L-219

Research Title: Cytoskeletal Adaptation During Suspended Animation

Research Description:
Christopher Lowe

Position at MBL: PI - Principal Investigator

Institution Contact Information: Hopkins Marine Station of Stanford University
Biology
120 Ocean View Blvd.
Pacific Grove California 93950

Email: clowe@stanford.edu

Dates at MBL: 09/01/2015 - 09/30/2015 Room Assignment: R-326

Research Title: Axis, neural and pattern formation in the marine hemichordate, Saccoglossus kowalevskii.

Research Description:

Jane Maienschein

Position at MBL: PI - Principal Investigator

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School of Life Sciences
341 E. 15th Street
Tempe Arizona 85281

Email: maienschein@asu.edu

Dates at MBL: 05/12/2015 - 07/31/2015 Room Assignment: L-228

Research Title: MBL History Project

Research Description: This is an ongoing NSF-funded project to document and interpret documents related to the history of MBL and MBL science.
Jocelyn Malamy

Position at MBL: PI - Collaboration Award

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MGCB
929 East 57th Street
GCIS 519W
Chicago IL 60637

Email: jmalamy@bsd.uchicago.edu

Dates at MBL: 06/27/2015 - 07/17/2015

Room Assignment: R-424

Research Title: Regeneration in clytia hemispherica, a new marine model system

Research Description: Together with Joel Smith, I will be assessing transcriptional changes in clytia during organ regeneration, and exploring the affects of gene knockouts in predicted regeneration genes. I will also be leading the exploratory phase for a clytia course for 2016, directed by myself, DM Welch and K. Gribble. Preliminary experiments will be performed in collaboration with these researchers, as well as collection trips with David Remsen and imaging tool development.

Robert Malchow

Position at MBL: PI - Principal Investigator

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M/C 067 room 4083 SEL
840 West Taylor Street
Chicago IL 60607

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Dates at MBL: 06/17/2015 - 08/23/2015

Room Assignment: MRC-306

Research Title:

Research Description:
Satyajit Mayor

Position at MBL: PI - HHMI Summer Program

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Cell Organization and Signalling
Bellary Road
Bangalore Karnataka 560065

Email: mayor@ncbs.res.in
Dates at MBL: 07/01/2015 - 08/01/2015
Room Assignment: R-319/320/321

Research Title: Cell Organization and Signalling
Research Description:

Allen Mensinger

Position at MBL: PI - Principal Investigator

Institution Contact Information: University of Minnesota Duluth
Biology
1035 Kirby Dr
Biology
Duluth Minnesota 55812

Email: amensing@d.umn.edu
Dates at MBL: 05/01/2015 - 09/01/2015
Room Assignment: MRC 306

Research Title: Sound localization in free swimming toadfish
Research Description: The toadfish use sound for mate attraction. However, unlike terrestrial animals, the hearing organs are in close proximity and this combined with the faster speed of underwater sound makes it difficult for the fish to use temporal delays to localize sound. By implanting chronic electrodes in the hearing organs, we will determine how fish use both the utricle and lateral line to localize sound.

The REU will recruit 10 undergraduates for the summer session and allow them to do scientific studies in a mentor's laboratory at the MBL.
Amanda Mifflin

**Position at MBL:** PI - MBL Research Award

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Chemistry
1500 N Warner
CMB 1015
Tacoma WA 98416

**Email:** amifflin@pugetsound.edu

**Dates at MBL:** 08/16/2015 - 11/08/2015  
**Room Assignment:** Ecosystems

**Research Title:** Field and Nonlinear Spectroscopic Studies of Iron Availability and Reduction at Mineral/Water Interfaces

**Research Description:** The proposed research will employ a dual approach of laboratory laser experiments and field techniques to investigate the interactions of organic ligands with iron oxide mineral/water interfaces. The development of a collaboration between the scientists at MBL and myself will create an exciting synergistic research effort that would uncover novel information about molecular structure and interactions between iron and organic ligands commonly found in soils and sediments. This research brings state-of-the-art surface spectroscopic measurements and interdisciplinary field methods together to investigate molecular-level reactions of organic ligands at the iron oxide mineral/water interface.

Andrew Miller

**Position at MBL:** PI - Principal Investigator

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Division of Life Science
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**Dates at MBL:** 06/01/2015 - 08/30/2015  
**Room Assignment:** R-220

**Research Title:** Elucidating the mechanisms and function of Ca2+ signaling during early neurogenesis: Identification of conserved elements among vertebrates.

**Research Description:** The earliest steps of neurogenesis include neural induction, the differentiation of neural progenitors into neurons, and the neuro-glial switch. This temporal sequence during early neural development is thought to be widely conserved across vertebrates. Numerous studies have explored the causal regulatory networks that control each sequential step. Our particular interest is in the diverse roles played by Ca2+ signalling, via a combination of specific elements of what has been described as a cellular Ca2+ signalling toolkit, and how these elements participate in the complex and interacting signalling pathways that modulate each sequential step in neurogenesis.
Overview. Human activities are altering the environment at an alarming rate. Local stressors, such as contaminated water and urbanization, and global ones, such as climate change and ocean acidification, are combining to accelerate the rates of degradation. The nervous system is the interface between an organism and its environment making neuroscience a critical discipline in understanding how organisms respond to change. The Puerto Rico Center for Environmental Neuroscience (PRCEN) combines neuroscience and environmental science in order to tackle environmental issues in Puerto Rico's ecosystems.
Brian Mitchell

Position at MBL: PI - MBL Research Award

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Cell and Molecular Biology
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Chicago IL 60611

Email: brian-mitchell@northwestern.edu

Dates at MBL: 06/13/2015 - 08/16/2015
Room Assignment: NXR

Research Title: Molecular Analysis of the Deuterosome using Genome Editing
Research Description:
As the cells divide, small cellular structures called centrioles form the foundation of the microtubule spindle pole that is responsible for accurately separating our chromosomes. Our goal is to understand the regulation of centriole biogenesis. Normal centriole duplication occurs when a daughter centriole nucleates off an existing mother centriole. We have discovered that centrioles can nucleate "de novo" without a mother centriole, and instead use a structure called the deuterosome. Our goal is to generate genetic mutants in Xenopus to characterize the deuterosome components for their role in centriole biogenesis. By generating these mutants we will perform the first systematic analysis of deuterosome mediated centriole biogenesis.

Timothy Mitchison

Position at MBL: PI - Principal Investigator

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Systems Biology
200 Longwood Ave
Boston MA 02115

Email: timothy_mitchison@hms.harvard.edu

Dates at MBL: 06/13/2015 - 09/06/2015
Room Assignment: L-225/226

Research Title: Scaling of microtubule assemblies in nanodroplets
Research Description:
We will ask how microtubule assemblies adjust to the size of the cell during early cleavage divisions in Xenopus (frog) eggs. To do this we will take an artificial cell approach. We will partition extract from frog eggs into nanodroplets of different sizes, and use microscope to measure the size of microtubule assemblies that form inside them
John Montgomery

Position at MBL: PI - Principal Investigator

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Biological Sciences
3 Symonds St
Auckland Auckland Private Bag

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Dates at MBL: 06/01/2015 - 06/25/2015  Room Assignment: R-211

Research Title: Research
Research Description: The ultimate goal of our laboratory is to elucidate molecular mechanisms for the regulation of intracellular trafficking in neurons. Toward this end, they use a variety of experimental approaches including microscopic, biochemical, and cell biological assays.

Research Title: Addressing axon-specific toxic effects of neuropathogenic proteins.
Research Description: Our current research program addresses basic questions on the basic biology of microtubule-based molecular motors and regulatory mechanisms of axonal transport. Main projects include: 1) addressing the role of specific protein kinases on axonal transport in health and disease, 2) elucidating the molecular basis of kinase activation by mutant pathogenic proteins.

Gerardo Morfini

Position at MBL: PI - Principal Investigator

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808 S. Wood St. Rm#568
Chicago IL 60612

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Dates at MBL: 07/01/2015 - 09/01/2015  Room Assignment: R-109
Thomas Mueller-Reichert

Position at MBL: PI - Principal Investigator

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Medical Faculty Carl Gustav Carus
Fiedlerstraße #223;e 42
Dresden Saxony 01307

Email: mueller-reichert@tu-dresden.de

Dates at MBL: 08/05/2015 - 08/18/2015
Room Assignment: L-216/217

Research Title: Research
Description: The overarching goals of this proposal are to identify molecular effectors of mitotic spindle and interphase nuclear scaling using microfluidic encapsulation. The goals are to develop microfluidic techniques to allow experiments to be performed in a spatially and temporally controlled manner. The research plan is organized into three distinct goals: 1) interfacial polymerization for the creation of a synthetic cell cortex, 2) photopolymerized structures that control the spatial nucleation of biological structures; and 3) the microfabrication of photolabile hydrogel structures and their co-encapsulation with spindles and nuclei to dynamically regulate the cell cycle in vitro.

John Oakey

Position at MBL: PI - MBL Research Award

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Chemical and Petroleum Engineering
1000 E University Ave
Laramie WY 82071

Email: joakey@uwyo.edu

Dates at MBL: 06/01/2015 - 08/16/2015
Room Assignment: L225/226

Research Title: In situ Hydrogel Microfabrication to Produce Functional Biomimetic Surfaces
Research Description: The overarching goals of this proposal are to identify molecular effectors of mitotic spindle and interphase nuclear scaling using microfluidic encapsulation. The goals are to develop microfluidic techniques to allow experiments to be performed in a spatially and temporally controlled manner. The research plan is organized into three distinct goals: 1) interfacial polymerization for the creation of a synthetic cell cortex, 2) photopolymerized structures that control the spatial nucleation of biological structures; and 3) the microfabrication of photolabile hydrogel structures and their co-encapsulation with spindles and nuclei to dynamically regulate the cell cycle in vitro.
Tomoko Ohyama

Position at MBL: PI - Grass Fellows

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zlastic lab
19700 Helix Dr
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Dates at MBL: 05/25/2015 - 08/29/2015

Room Assignment: R-201/223

Research Title: Computation of a command-like neuron in Drosophila larvae during multisensory integration

Research Description: To adapt successfully to the environment, animals must execute the most appropriate action in a given circumstance from among many potential behavioral options. A key feature of neurons and central nervous systems is their capacity for performing multisensory computations to select the proper actions. The aim of my project at the Grass Fellowship is to clarify how individual neurons work together to accomplish such computations within the neural circuitry that controls a well-defined larval Drosophila escape behavior.

Stephanie Palmer

Position at MBL: PI - Collaboration Award

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Organismal Biology and Anatomy
1027 E 57th St
Room 104
Chicago Illinois 60637

Email: sepalmer@uchicago.edu

Dates at MBL: 07/11/2015 - 07/25/2015

Room Assignment: MRC

Research Title: Color visual perception: advancing sensory ecology with innovative neural modeling and hyperspectral imaging

Research Description:
Harish Pant

Position at MBL: PI - Principal Investigator

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NINDS
Building 49 Room 2A-28
Bethesda MD 20892

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Dates at MBL: 06/21/2015 - 09/05/2015  Room Assignment: R-326

Research Title: Topographic regulation of neuronal Cytoskeletal protein phosphorylation in squid giant axon system as a model; To understand the regulatory mechanisms of neurophysiology and pathology.

Research Description: At MBL, in addition of several key programs proposed, we plan to expand the squid biology beyond its present status and become a major research/educational/training program in the future. This will happen as soon as the squid (loligo pealli) genome is completed and annotated. Hence the studies of neurophysiology, development, cell biology and biochemistry will evolve and become of widespread interest at MBL.

Karin Rengefors

Position at MBL: PI - MBL Research Award

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Department of Biology
Ecology Building
Lund Sweden 22362

Email: karin.rengefors@biol.lu.se

Dates at MBL: 06/13/2015 - 08/01/2015  Room Assignment: Bay Paul Center

Research Title: Single-cell population genomic analyses of an invasive microalgae

Research Description: The aim of this work is to develop single-cell genome (SCG) amplification techniques to study population genomics in the freshwater species Gonyostomum semen, which has expanded across Europe but not in N. America. We will combine SCG with a population genomic technique: RADtag sequencing. If this approach works it will be a huge step forward for research on microalgal ecology and evolution. Ultimately this method could provide information that can be used to control harmful species including parasitic protists. In this project we will combine my skills in population genetics and knowledge on the G. semen system, with the knowledge the MBL team has in genomics and molecular evolution.
Lawrence Rome

Position at MBL: PI - Principal Investigator

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Biology Department
Leidy Labs
Philadelphia PA 19104

Email: Lawrence.rome@gmail.com

Dates at MBL: 06/01/2015 - 08/26/2015
Room Assignment: R-313

Research Title: Paying the Piper: How two fish species adjust muscle calcium cycling for different mating calls (~5% duty-cycle calls by toadfish and 100% duty cycle calls by midshipman.)

Research Description: NSF funded research will be performed in Rowe 313 which was committed for 2015 (Drs. Ruderman and Gitlin; Oct 28, 2013).

Activities will include: 1) Prof Coen Elemans will come from Denmark to help finish muscle mechanics measurements to relate toadfish muscle power output to toadfish sound production at different temperatures. 2) While Elemans is here we (along with my postdoc, Frank Nelson), will also set up lab to perform workloop experiments on superfast sonic muscle from midshipman. 3) In collaboration with Al Mensinger, will perform prelim exps for NSF grant renewal involving instrumenting a midshipman with electrodes for stimulating the sonic motor nerves while recording acoustic power with hydrophone.

Michael Rosen

Position at MBL: PI - HHMI Summer Program

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Dates at MBL: 06/20/2015 - 08/15/2015
Room Assignment:

Research Title:

Research Description:
William Ross

Position at MBL:  PI - Principal Investigator

Institution Contact Information:  
New York Medical College
Physiology
40 Sunshine Cottage Road
Valhalla New York 10595

Email:  ross@nymc.edu

Dates at MBL:  06/07/2015 - 08/23/2015  
Room Assignment:  R-206

Research Title:  Sodium imaging of dendritic function
Research Description:  We have been developing techniques to simultaneously image sodium and calcium changes in dendrites. This technique will be especially useful in examining phenomena that do not exactly repeat following some standard stimulation. One specific project involves the mechanisms underlying NMDA spikes in dendrites. We are interested in how the regenerative activation of the NMDA receptor couples to the regenerative Ca2+ spike in different dendritic regions (basal dendrites, apical tufts, and oblique dendrites). The P.I. and collaborators have extensive experience examining these kinds of dendritic events using standard techniques. With simultaneous imaging we expect to answer some of the elusive questions in this field.

Honi Sanders

Position at MBL:  PI - Grass Fellows

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Dates at MBL:  05/25/2015 - 08/29/2015  
Room Assignment:  R-201/223

Research Title:  Modeling the Grid Cell as Abstraction of Spatial Structure
Research Description:  Hippocampal place cells tend to fire when an animal is in a particular location in a given environment, termed a place field. Entorhinal grid cells tend to fire when the animal is on vertices of a regularly spaced triangular grid. While the spatial relationship between the place fields of different place cells is environment specific, the relationship between the firing fields of grid cells in the same subnetwork is the same in every environment. This fact allows universal spatial relationships to be learned once and applied to any arbitrary new environment, exemplifying the benefits of abstraction. This proposal aims to build a model of grid cell development and function based on this framework. Once built, I will explore how such a network could be reused in multiple environments. Finally, I will extend the network to apply to causal learning.
Adriano Senatore

Position at MBL: PI - Grass Fellows

Institution Contact Information: Georgia State University
Neuroscience Institute
161 Jesse Hill Jr. Dr. SE
Atlanta GA 30302

Email: adriosenatore@gmail.com

Dates at MBL: 05/25/2015 - 08/29/2015

Research Title: Evaluating the roles of electrical excitability and voltage-gated calcium channels in Trichoplax adhaerens, an enigmatic animal that lacks neurons and muscle.

Research Description: Voltage-gated calcium channels (Cav channels) play key roles in translating electrical signals in neurons and muscle into biochemical processes. Interestingly, the enigmatic basal animal Trichoplax adhaerens lacks neurons and muscle, yet it harbors a nearly full complement of genes required for electrical signaling and synaptic electrochemical communication. This includes genes for the three types of Cav channels: 1) a pre-synaptic secretion-associated Cav2 channel, 2) a post-synaptic (neuromuscular junction), contraction-associated Cav1 channel, and 3) a low threshold rhythm-generating Cav3 channel. As a Grass Fellow, I will seek to explore the unknown electrical properties of Trichoplax cells, and to determine the contributions of Cav channels to Trichoplax physiology.

Hari Shroff

Position at MBL: PI - Principal Investigator

Institution Contact Information: National Institute of Biomedical Imaging and Bioengineering
Section on High Resolution Optical Imaging
13 South Drive
Bethesda MD 20892

Email: hari.shroff@nih.gov

Dates at MBL: 07/01/2015 - 08/15/2015

Research Title: Improving the performance of dual-view selective plane illumination microscopy (with Patrick LaRiviere) and An Integrated System for Single Cell Analysis (with Zhirong Bao, Daniel Colon-Ramos,

Research Description: The first project aims to improve the resolution and depth penetration of dual-view selective plane illumination microscopy (diSPIM) with computational tools developed by Patrick LaRiviere. The second project continues research begun two summers ago, applying diSPIM to building a 4D atlas with subcellular resolution of the intact nematode embryo.
Neil Shubin
Position at MBL: PI - Principal Investigator
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Organismal Biology and Anatomy
1027 E 57th Street
Culver Hall 106
Chicago IL 60637

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Dates at MBL: 06/22/2015 - 08/31/2015  Room Assignment: R-322
Research Title: Research
Description: We use bi-flagellate green alga Chlamydomonas during the winter and marine organisms during the summer to study the assembly and disassembly of the flagellar axoneme, activities that are confined to the flagellar tip; thus, the flagellar tip complex (FTC) contains some very interesting proteins. We have used mass spectrometry to identify tip specific proteins and discovered a protein methylation pathway in flagella that is up-regulated during disassembly and is located at the flagellar tip. We wish to extend these studies by using the cilia of various marine organisms (clam gills, sea urchin embryos), available at the MBL during the summer.

Roger Sloboda
Position at MBL: PI - Principal Investigator
Institution Contact Information: Dartmouth College
Biological Sciences
222 LSC
78 N. College St.
Hanover NH 03755

Email: rds@dartmouth.edu
Dates at MBL: 06/21/2015 - 08/31/2015  Room Assignment: L-121
Research Title: Protein Methylation in Cilia and Flagella
Description: We use bi-flagellate green alga Chlamydomonas during the winter and marine organisms during the summer to study the assembly and disassembly of the flagellar axoneme, activities that are confined to the flagellar tip; thus, the flagellar tip complex (FTC) contains some very interesting proteins. We have used mass spectrometry to identify tip specific proteins and discovered a protein methylation pathway in flagella that is up-regulated during disassembly and is located at the flagellar tip. We wish to extend these studies by using the cilia of various marine organisms (clam gills, sea urchin embryos), available at the MBL during the summer.
Greenfield Sluder

Position at MBL: PI - Principal Investigator

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Cell and Developmental Biology S6-212
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Email: greenfield.sluder@umassmed.edu

Dates at MBL: 06/08/2015 - 10/05/2015
Room Assignment: L-223

Research Title: Control of centriole assembly and copy number
Research Description: Centrioles organize spindle poles. Too few and too many spindle poles lead to genomic instability, a hallmark of cancer. It is of critical importance for the cell to limit centriole copy number. We will investigate how this is accomplished.

Jeramiah Smith

Position at MBL: PI - Collaboration Award

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675 Rose Street
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Email: jjsmit3@uky.edu

Dates at MBL: 07/12/2015 - 07/18/2015
Room Assignment: R-411

Research Title: The Molecular Evolution of a Neuron
Research Description: Experiments to understand the evolution of specific neurons within the brain
Timothy Springer

Position at MBL: PI - Principal Investigator

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Medicine
3 Blackfan Circle
Boston MA 02115

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Dates at MBL: 06/14/2015 - 09/01/2015
Room Assignment: R-305/307

Research Title: Lillie Award
Research Description: Fluorescent measurement of integrin alignment by the actin cytoskeleton

Mark Terasaki

Position at MBL: PI - Principal Investigator

Institution Contact Information: University of Connecticut Health Center
Cell Biology
263 Farmington Ave
Farmington CT 06030

Email: terasaki@uchc.edu
Dates at MBL: 05/15/2015 - 10/01/2015
Room Assignment: R-113

Research Title: Three dimensional organization of the endoplasmic reticulum
Research Description: The endoplasmic reticulum is an organelle that performs essential functions, including protein synthesis, lipid synthesis and calcium regulation. It has a complex three dimensional structure that is poorly characterized even at present, 70 years after its discovery. We are using serial section electron microscopy to address this.
Research Title: Biomechanical tuning of the functional circuit of the lamprey central pattern generator for locomotion

Research Description: Animals move effectively through complex and unpredictable environments using small networks of neurons called central pattern generators (CPGs). CPGs not only activate the muscles in the appropriate way for locomotion, but they also adjust the response to sensory inputs. We will collaborate with MBL scientists to study the CPG network in the lamprey, the only vertebrate for which the basic circuit is known. We will use advanced imaging techniques to examine how the circuit changes its function to meet different biomechanical demands. Results will be relevant for therapies for spinal cord injury and stroke, for designing prosthetic devices, and for developing advanced robotic devices.

Ron Vale

Position at MBL: PI - HHMI Summer Program

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Dates at MBL: 06/15/2015 - 08/20/2015

Room Assignment: R-319/320/321
Fernando Vonhoff

Position at MBL: PI - Grass Fellows

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Dates at MBL: 05/25/2015 - 08/29/2015
Room Assignment: R-201/223

Research Title: Cellular and molecular mechanisms of synaptogenesis in the CNS
Research Description: During development, motile dendritic filopodia expand and make contacts with growing axonal terminals. Thus, central synapse formation and stabilization occurs in a highly dynamic environment. The activity-dependent molecular mechanisms regulating local dendritic growth and synapse stabilization are incompletely understood, and technical limitations have restricted their examination in vivo. I propose to characterize functional connections between singly identified motoneurons and sensory cells in the Drosophila larval CNS using electrophysiological, anatomical and imaging methods. I will test the hypothesis that synapse formation and refinement in the CNS is regulated by second messenger signaling as observed in NMJ development. I will also test consequences of altered sensory-motor connectivity in the maturation of peristaltic/crawling behavior.

Clare Waterman

Position at MBL: PI - Principal Investigator

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Dates at MBL: 06/06/2015 - 08/30/2015
Room Assignment: R-305/307

Research Title: Fluorescence polarization studies of Integrins
Research Description: Integrins are cell surface receptors that are involved in the immune response, development, and cancer. We aim to test the hypothesis that the organization of integrins on the cell surface by the cytoskeleton is required for their function.
Jim Wilhelm

Position at MBL: PI - HHMI Summer Program

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Dates at MBL: 06/20/2015 - 08/02/2015 Room Assignment: R-319/320/321

Research Title: Analysis of lipid phase behavior of the purified synaptosomes of the Woods Hole Squid.
Research Description: The Woods Hole Squid allows scientists to purify the essential switches of the nervous system: the synapse. We wish to understand why this tiny organ has such a unique lipid phase behavior.

Joshua Zimmerberg

Position at MBL: PI - Principal Investigator

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Dates at MBL: 06/01/2015 - 09/30/2015 Room Assignment: R-310

Research Title: Analysis of lipid phase behavior of the purified synaptosomes of the Woods Hole Squid.
Research Description: The Woods Hole Squid allows scientists to purify the essential switches of the nervous system: the synapse. We wish to understand why this tiny organ has such a unique lipid phase behavior.
Erik Zornik

Position at MBL: PI - MBL Research Award

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Dates at MBL: 07/13/2015 - 09/21/2015 Room Assignment: R-205

Research Title: Functional imaging of novel central pattern generator neurons
Research Description: How are neuronal rhythms generated? To answer this question, we are studying the vocal central pattern generator (CPG) of the frog, Xenopus laevis. The male vocal CPG generates a biphasic pattern, and electrophysiological studies have revealed two neuronal populations that may underlie each phase. We will use 2-photon calcium imaging to understand how these two populations functionally interact. The development of these techniques will be achieved in consultation with some of the many imaging experts that visit the MBL each year. Results will begin to reveal how alternating patterns of activation can be achieved in a temporally complex CPG.

Steven Zottoli

Position at MBL: PI - Principal Investigator

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Dates at MBL: 05/01/2015 - 09/01/2015 Room Assignment: R-213

Research Title: Effects of environmental changes on the central nervous system of fishes
Research Description: This study designed to monitor a central neuron and the behavior it elicits when exposed to environmental change (e.g., pH, hypoxia or temperature). Our main goal is to determine the impact of environmental variables on escape responses in fishes since these responses determine survival from predation. We will study Mauthner cells (M-cell) in cunner fish, since this central neuron is known to initiate escape responses in fishes. The characterization of M-cell morphology and physiology will provide baseline information from which we can compare physiological properties of this cell after exposure to environmental variables such as hypoxia, pH and temperature.