



Origins and Diversity of Neuromodulatory Mechanisms that Serve Basic Biological Needs

June 4 - 9, 2017

Chairs

Joy A. Alcedo and Chun-Fang Wu

Vice Chairs

Scott Waddell and Rainer Friedrich

Grand Summit Hotel at Sunday River

97 Summit Road

Newry, ME, US

Conference Description

Basic biological needs, such as food, sleep or sex, modulate many physiological processes and drive the evolution of highly specialized and complex behaviors. The intensity and complexity of such biological drives and corresponding physiological states involve the modulation of a variety of neural circuits, where the interplay between neuromodulation and behavioral outcomes optimize survival in the changing environment.

This 2017 GRC meeting will bring together scientists from different disciplines to address neuromodulatory mechanisms that shape behaviors in response to these needs in health and disease. The meeting will include several general discussion sessions that aim to elucidate the similarities and distinctions across species and allow integration of concepts among diverse fields and the synthesis of general principles that underlie neuromodulation. Optimally, the organized and informal discussions, as well as the talks from invited speakers and from selected abstracts, of this meeting should highlight promising directions and promote renewed perspectives for the broad field of neuromodulation.

Conference Program

Sunday

2:00 pm - 9:00 pm	Arrival and Check-in
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6:00 pm - 7:00 pm	Dinner
7:30 pm - 7:40 pm	Introductory Comments by GRC Site Staff / Welcome from the GRC Chair
7:40 pm - 9:30 pm	Keynote Session: Beyond the Connectome Discussion Leader: Barry Ganetzky (University of Wisconsin-Madison, USA)
7:40 pm - 7:45 pm	Opening Remarks
7:45 pm - 8:20 pm	Mu-ming Poo (Institute of Neuroscience, Chinese Academy of Sciences, China) "Spike-Timing and Neuromodulation: From Synapse to Cognition"
8:20 pm - 8:30 pm	Discussion
8:30 pm - 8:45 pm	Elissa Hallem (University of California, Los Angeles, USA) "Flexible Olfactory Behaviors of Parasitic Nematodes"
8:45 pm - 8:50 pm	Discussion
8:50 pm - 9:05 pm	Karla Kaun (Brown University, USA) "Neuromolecular Mechanisms Underlying Alcohol Seeking in <i>Drosophila</i> "
9:05 pm - 9:10 pm	Discussion
9:10 pm - 9:25 pm	David Prober (California Institute of Technology, USA) "Neuropeptidergic Regulation of Zebrafish Sleep"
9:25 pm - 9:30 pm	Discussion
Monday	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	Modulation of Food-Dependent Behaviors Discussion Leader: Rainer Friedrich (Friedrich Miescher Institute for Biomedical Research, Switzerland)

9:00 am - 9:25 am	Herwig Baier (Max Planck Institute of Neurobiology, Germany) "Hunting on an Empty Stomach: Neural Circuits for Prey Capture in Larval Zebrafish"
9:25 am - 9:35 am	Discussion
9:35 am - 10:00 am	Marla Sokolowski (University of Toronto, Canada) "The <i>foraging</i> Gene: Unravelling Food-Related Behaviors and Metabolism"
10:00 am - 10:10 am	Discussion
10:10 am - 10:35 am	Jing Wang (University of California, San Diego, USA) "Modulation of Olfactory Information Processing Underlies Flexible Feeding and Mating Behaviors"
10:35 am - 10:45 am	Discussion
10:45 am - 11:10 am	Coffee Break
11:10 am - 11:35 am	Piali Sengupta (Brandeis University, USA) and Michael O'Donnell (Brandeis University, USA) "Modulation of Phenotypic Plasticity by Gut-Brain Signaling"
11:35 am - 11:45 am	Discussion
11:45 am - 11:55 am	Jennifer Li (Harvard University, USA) and Drew Robson (Rowland Institute at Harvard, USA) "Pan-Neuronal Imaging of Feeding and Reward Circuitry in Freely Swimming Larval Zebrafish with a High-Speed Tracking Microscope"
11:55 am - 12:00 pm	Discussion
12:00 pm - 12:10 pm	Michael Pankratz (University of Bonn, Germany) "The Sensory-Motor Connectome (and Beyond) of a Fly Feeding Network"
12:10 pm - 12:15 pm	Discussion
12:15 pm - 12:25 pm	Catherine Schretter (California Institute of Technology, USA) "The Gut Microbiota Modulates Locomotor Behavior in <i>Drosophila</i> "
12:25 pm - 12:30 pm	Discussion

12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	Poster Session
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	Neuromodulation in Reward and Addiction Discussion Leader: Marla Sokolowski (University of Toronto, Canada)
7:30 pm - 7:45 pm	Lisha Shao (Janelia Research Campus, Howard Hughes Medical Institute, USA) "A Three-Layered Circuit that Underlies the Female Mating Experience"
7:45 pm - 7:50 pm	Discussion
7:50 pm - 8:05 pm	Vadim Bolshakov (Harvard Medical School, USA) "Neuropeptide-Mediated Gating of Innate Fear Circuits"
8:05 pm - 8:10 pm	Discussion
8:10 pm - 8:30 pm	Wei-Dong Yao (SUNY Upstate Medical University, USA) "Cocaine Hijacks Hebbian Synaptic Learning Rules in the Mouse Prefrontal Cortex"
8:30 pm - 8:40 pm	Discussion
8:40 pm - 9:00 pm	Minmin Luo (National Institute of Biological Sciences, Beijing / Tsinghua University, China) "Reward Processing by Serotonin Neurons in the Dorsal Raphe"
9:00 pm - 9:10 pm	Discussion
9:10 pm - 9:30 pm	General Discussion
Tuesday	
7:30 am - 8:30 am	Breakfast

9:00 am - 12:30 pm	Experience- and Activity-Dependent Modulation Discussion Leader: Hollis Cline (The Scripps Research Institute, USA)
9:00 am - 9:25 am	Yun Zhang (Harvard University, USA) "Modulation of the Neural Circuit Underlying Olfactory Learning"
9:25 am - 9:35 am	Discussion
9:35 am - 10:00 am	Mani Ramaswami (Trinity College Dublin, Ireland) "Inhibitory Engrams in Perception and Memory"
10:00 am - 10:10 am	Discussion
10:10 am - 10:35 am	Yi Zhong (McGovern Institute for Brain Research, Tsinghua University, China) "Active Protection and Passive Forgetting"
10:35 am - 10:45 am	Discussion
10:45 am - 11:10 am	Coffee Break
11:10 am - 11:35 am	Daniel Margoliash (University of Chicago, USA) "Modulating Intrinsic Neuronal Plasticity Across Individuals, Times Scales, and Behavior in Birdsong Learning"
11:35 am - 11:45 am	Discussion
11:45 am - 11:55 am	Eric Horstick (National Institutes of Health, USA) "Larval Zebrafish Show Individual Left/Right Bias in Movement Direction During Local Light-Search Behavior"
11:55 am - 12:00 pm	Discussion
12:00 pm - 12:10 pm	Nobuko Inoue (University of Fukui School of Medical Sciences, Japan) "Sema7A Signaling Mediates Olfactory Imprinting During the Critical Period in Mice"
12:10 pm - 12:15 pm	Discussion

12:15 pm - 12:25 pm	Baibing Zhang (Institute of Neuroscience, Chinese Academy of Sciences, China) " Left Habenula Mediates Light-Preference Behavior in Zebrafish via an Asymmetrical Visual Pathway"
12:25 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	Poster Session
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	Modulation of Synaptic and Circuit Plasticity Discussion Leader: Mu-ming Poo (Institute of Neuroscience, Chinese Academy of Sciences, China)
7:30 pm - 7:40 pm	Brett Berke (Truman State University, USA) "Activity-Dependent Synaptic Plasticity: Temporal and Spatial Regulation by Retrograde Signaling at the <i>Drosophila</i> NMJ"
7:40 pm - 7:45 pm	Discussion
7:45 pm - 7:55 pm	Sarah Certel (University of Montana, USA) "Aggression Requires the Function of Both Glutamate and Octopamine in Dual Neurotransmitting Neurons"
7:55 pm - 8:00 pm	Discussion
8:00 pm - 8:10 pm	Pablo Maldonado (University of Utah, USA) "The Molecular Machinery Underlying Navigation"
8:10 pm - 8:15 pm	Discussion
8:15 pm - 8:35 pm	Kara Pratt (University of Wyoming, USA) "Subcellular Segregation of Sensory Inputs in the <i>Xenopus</i> Tadpole Optic Tectum"
8:35 pm - 8:45 pm	Discussion

8:45 pm - 9:00 pm	Jeffrey Gavornik (Boston University, USA) "ACh Signaling Modulates Long-Term Plasticity that Modifies Gamma Frequency Coding of Spatiotemporal Information in the V1 Visual Cortex"
9:00 pm - 9:10 pm	Discussion
9:10 pm - 9:30 pm	General Discussion
Wednesday	
7:30 am - 8:30 am	Breakfast
8:30 am - 9:00 am	Group Photo
9:00 am - 12:30 pm	Neuromodulation of Circadian Behaviors and Sleep Versus Arousal States Discussion Leader: Ronald Hoy (Cornell University, USA)
9:00 am - 9:25 am	Paul Taghert (Washington University in St. Louis, USA) "Modulation of Neuronal Activity in the <i>Drosophila</i> Circadian Pacemaker Circuit"
9:25 am - 9:35 am	Discussion
9:35 am - 10:00 am	Yang Dan (University of California, Berkeley, USA) "Neural Circuits Controlling Sleep"
10:00 am - 10:10 am	Discussion
10:10 am - 10:25 am	John O'Donnell (University of Rochester, USA) "Concerted Shifts in Interstitial Ions Alter Extracellular Space and Control Neuronal Activity in the Sleep-Wake Cycle"
10:25 am - 10:30 am	Discussion
10:30 am - 10:55 am	Coffee Break
10:55 am - 11:05 am	Annika Nichols (Research Institute of Molecular Pathology (IMP), Austria) "A Global Brain State Underlies <i>C. elegans</i> Sleep Behavior"
11:05 am - 11:10 am	Discussion

11:10 am - 11:20 am	Samuel Belfer (University of Pennsylvania, USA) "A Neurobiological Basis for Behavioral Sleep Modification in <i>Drosophila</i> "
11:20 am - 11:25 am	Discussion
11:25 am - 11:35 am	Yue Chen (National Engineering Laboratory for Neuromodulation, Tsinghua University, China) "Chronic Local Field Potential Recordings of Subthalamic Nucleus in the State of Sleep and Wakefulness"
11:35 am - 11:40 am	Discussion
11:40 am - 11:50 am	Caroline Wee (Harvard University, USA) "Social Modulation of Appetite via Zebrafish Hypothalamic Circuits"
11:50 am - 11:55 am	Discussion
11:55 am - 12:05 pm	Ilona Grunwald Kadow (Technical University of Munich, Germany) "Mating-State Dependent Chemosensory Decision Making"
12:05 pm - 12:10 pm	Discussion
12:10 pm - 12:25 pm	Ralph Greenspan (University of California, San Diego, USA) "Mapping the Brain from the Inside Out: From <i>Drosophila</i> to Humans"
12:25 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	Poster Session
6:00 pm - 7:00 pm	Dinner
7:00 pm - 7:30 pm	Business Meeting <i>Nominations for the Next Vice Chair; Fill in Conference Evaluation Forms; Discuss Future Site and Scheduling Preferences; Election of the Next Vice Chair</i>

7:30 pm - 9:30 pm	<p>Modulation of Affection Behavior and Social Interactions</p> <p>Discussion Leader: Mario De Bono (MRC Laboratory of Molecular Biology, United Kingdom)</p>
7:30 pm - 7:55 pm	<p>Lisa Stowers (The Scripps Research Institute, USA)</p> <p>"Personalized Olfactory Perception Underlies Individual Differences in Behavior"</p>
7:55 pm - 8:05 pm	Discussion
8:05 pm - 8:30 pm	<p>Daisuke Yamamoto (Tohoku University, Japan)</p> <p>"An Attempt to Visualize and Activate the Courtship Circuitry in a Non-Model <i>Drosophila</i> Species"</p>
8:30 pm - 8:40 pm	Discussion
8:40 pm - 8:50 pm	<p>Quentin Gaudry (University of Maryland, USA)</p> <p>"Sexually-Dimorphic Neuromodulation of Pheromone Responses in <i>Drosophila</i>"</p>
8:50 pm - 8:55 pm	Discussion
8:55 pm - 9:05 pm	<p>Kenta Asahina (The Salk Institute for Biological Studies, USA)</p> <p>"Agonistic Interaction as a Strategic Action Choice Process"</p>
9:05 pm - 9:10 pm	Discussion
9:10 pm - 9:30 pm	General Discussion
Thursday	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	<p>Modulation of Circuit Development and Aging</p> <p>Discussion Leader: Mani Ramaswami (Trinity College Dublin, Ireland)</p>
9:00 am - 9:25 am	<p>Barry Ganetzky (University of Wisconsin-Madison, USA)</p> <p>"NMJ Development and Maintenance in Long-Lived Larvae"</p>
9:25 am - 9:35 am	Discussion

9:35 am - 9:50 am	Queelim Ch'ng (King's College London, United Kingdom) "Modulating Information Processing Functions in a Neural Code for Food"
9:50 am - 10:00 am	Discussion
10:00 am - 10:25 am	Shawn Xu (University of Michigan, USA) "Sensation, Circuits and Longevity"
10:25 am - 10:35 am	Discussion
10:35 am - 11:10 am	Coffee Break
11:10 am - 11:20 am	Veena Prahlad (University of Iowa, USA) "Sensory Experience and Learning Modulate the Expression of Molecular Chaperones in <i>C. elegans</i> "
11:20 am - 11:25 am	Discussion
11:25 am - 11:35 am	Carlos Pantoja (Max Planck Institute of Neurobiology, Germany) "Neuromodulatory Control of Behavioral Individuality in Zebrafish"
11:35 am - 11:40 am	Discussion
11:40 am - 11:50 am	Xuanmao Chen (University of New Hampshire, USA) "The Role of Type 3 Adenylyl Cyclase in Neuronal Cilia"
11:50 am - 11:55 am	Discussion
11:55 am - 12:20 pm	Hollis Cline (The Scripps Research Institute, USA) "Wiring Circuits in the Visual System: Time and Protein Synthesis"
12:20 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 5:30 pm	Poster Session
5:30 pm - 7:30 pm	Diversity and Evolution of Neuromodulation Discussion Leader: Ralph Greenspan (University of California, San Diego, USA)

5:30 pm - 5:50 pm	Zoe Donaldson (University of Colorado Boulder, USA) "Building a Monogamous Brain: Neural Activity Signatures Underlying Pair Bonding in Prairie Voles"
5:50 pm - 6:00 pm	Discussion
6:00 pm - 6:25 pm	Paul Katz (Georgia State University, USA) "Species-Differences in Neuromodulation Underlie Evolution of Behavior"
6:25 pm - 6:35 pm	Discussion
6:35 pm - 7:00 pm	Ronald Hoy (Cornell University, USA) "Still Crazy After All These Years: Non-Model Animal Systems—Truth Will Out"
7:00 pm - 7:10 pm	Discussion
7:10 pm - 7:30 pm	General Discussion
8:00 pm - 9:00 pm	Dinner
Friday	
7:30 am - 8:30 am	Breakfast
9:00 am	Departure

Contributors

 Gordon Research Conferences	 Carl Storm International Diversity Fellowship	 Predominantly Undergraduate Institution Fund (PUI)
 National Institute of Neurological Disorders and Stroke	 CellPress	 DSHB
 THE KAVLI FOUNDATION	 BUTTER INSTRUMENT	 WAYNE STATE

