Scientific Organizers:
Tony Koleske, Yale University, USA
Yimin Zou, University of California, San Diego, USA
Kristin Scott, University of California, Berkeley, USA
A. Kimberley McAllister, University of California, Davis, USA

Joint with the conference on **Connectomics**

A fundamental goal of neuroscience is to understand the molecular, cellular and activity-based mechanisms that control the formation and maintenance of neural circuits and determine how these mechanisms become compromised in neurodevelopmental, psychiatric and neurodegenerative disorders. Over the past four decades, molecular neuroscientists have identified key molecules and mechanisms that underlie synapse development, activity and stability. Meanwhile, the identification and characterization of different cell types has been transformed by single cell profiling techniques and study of neuronal circuits has been revolutionized by new optical methods to visualize, map and control circuits in living animals. Finally, there has been an explosion in the ability to identify genes associated with neurodevelopmental and psychiatric disorders and neurodegenerative diseases. Increasingly sophisticated animal models are proving useful to understand how dysfunction of affected genes and proteins contributes to disease pathology. Although researchers in all of these disciplines are studying the same fundamental issues, no small, highly interactive “Keystone-style” conferences bring these three groups together in the same room. In the belief that mutually beneficial insights will emerge from discussing each other’s work, this symposium will bring together leaders working on neuronal development, synapse development and plasticity, circuit structure and function, and the study of brain disease.

Session Topics:
• Cell Types of the Nervous System
• Cellular Morphogenesis in the Nervous System
• Synapse Development and Function
• Support Cells and ECM
• Neural Circuit Development and Function
• Neuronal Dysfunction Function in Disease

Scholarship Application & Discounted Abstract Deadline: **November 3, 2016**
Abstract Deadline: **December 7, 2016**
Discounted Registration Deadline: **January 11, 2017**

Note: Scholarships are available for graduate students and postdoctoral fellows and are awarded based on the abstract submitted.

Meeting Hashtag: #KSsynapse
www.keystonesymposia.org/17X1
SUNDAY, MARCH 5
Arrival and Registration

MONDAY, MARCH 6
Welcome and Keynote Session (Joint)

* Tony Koleske, Yale University, USA
Hollis T. Cline, The Scripps Research Institute, USA
Wiring Circuits in the Visual System

* Danielle S. Bassett, University of Pennsylvania, USA
Hongkui Zeng, Allen Institute for Brain Science, USA
Cell Type-Based Brain-Wide Connectomics

Cell Types of the Nervous System (X1)

* Kristin Scott, University of California, Berkeley, USA
Paola Arlotta, Harvard University, USA
Cell Fate Determination and Maintenance in Mammalian Cortex

Arnold R. Kriegstein, University of California, San Francisco, USA
Developmental Lineages Contributing to Neuronal Diversity in the Human Cortex

Jens Hjerling Leffler, Karolinska Institute, Sweden
Single Cell Analysis of the Juvenile Telencephalon

Geoffrey Stanley, Stanford University, USA
Short Talk: Discrete and Continuous Transcriptomic Identities of Striatal Neurons

Chan Lek Tan, University of California, San Francisco, USA
Short Talk: Molecular Identification of Thermoregulatory Neurons in the Hypothalamus using Activity-Dependent Ribosome Profiling

Building Connectomes at Micro, Meso and Macroscales (X2)

* Danielle S. Bassett, University of Pennsylvania, USA
Moritz Helmstaedter, Max Planck Institute for Brain Research, Germany
Cerebral Cortex Connectomics

Alard Roebroeck, Maastricht University, Netherlands
Imaging Human Connectome Networks at the Mesoscale

Justus Kebschull, Cold Spring Harbor, USA
Short Talk: A Single Neuron Resolution Mesoscale Connectome of the Mouse Cortex Obtained Rapidly by Barcoded RNA Sequencing

Claus C. Hilgetag, University Medical Center Eppendorf, Hamburg University, Germany
Short Talk: Linking Macroscale Brain Connectivity and Intrinsic Brain Architecture

Workshop 1: Circuit Function and Dysfunction and Disease (X1)

* A. Kimberley McAllister, University of California, Davis, USA

Summer Thyme, Harvard University, USA
Zebrafish Brain Activity Phenotypes Unify Schizophrenia-Associated Genes

Alan R. Mardini, University of California, Berkeley, USA
3D All-Optical Control of Functionally Defined Neurons with Cellular Resolution and Sub-Millisecond Precision

Michelle Antoine, University of California, Berkeley, USA
Increased Excitation-Inhibition (E-I) Ratio without Elevated Network Spiking in Autism Spectrum Disorder (ASD)

Xin Jin, Harvard University, USA
In vivo Investigation of Cortical Cell Type Development in Autism and Intellectual Disability: A Converged Heterogeneity?

Gabrielle L. Sell, Johns Hopkins University School of Medicine, USA
Reducing Ectopic Expression of Ephexin5 Ameliorates Cognitive Impairment in an Alzheimer Model

Ileana Lorenzini, Barrow Neurological Institute, USA
Synaptic Deficits in C9ORF72-ALS/FTD Patient-Derived iPSC Neurons and in vivo Models of C9

Kuan Hong Wang, NIMH, National Institutes of Health, USA
Dysfunction and Repair of Mesofrontal Dopaminergic Circuits in Neuropsychiatric Models

Chris Zimmerman, University of California, San Francisco, USA
The Neural Dynamics and Circuit Architecture Underlying Thirst

Workshop 1 (X2)

* Olaf Sporns, Indiana University, USA
Anjali Vijay Dobale, Pennsylvania State University, USA
Functional Connectivity Analysis of Fluorescent Calcium Imaging from Micro-Tissue Engineered Axonal Tracts

Liang Yuchi, Pennsylvania State University, USA
Bidirectional Growth Model of Micro-Tissue Engineered Neuronal Networks (micro-TENNs)

Shelli Kesler, University of Texas, USA
Disruption of the Functional Connectome in a 5XFAD Transgenic Mouse Model of Alzheimer's Disease

Amina Ann Qutub, University of Texas, USA
Identifying Design Principles of Differentiating Neural Cells

Ankit Khambhati, University of Pennsylvania, USA
Functional Subgraphs of Brain Networks Modulate Cognitive Control Processes between Task States

Bill Shannon, BioRankings, USA
Connectome Regression

Ioannis Pappas, University of Cambridge, UK
Spatial Complexity of Brain Connectivity during Altered Consciousness

UnCheol Lee, University of Michigan, USA
Network Mechanisms of Progressive, Abrupt, Early, and Delayed Emergences from Unconsciousness
**KEYSTONE SYMPOSIA**

**Synapses and Circuits: Formation, Function and Dysfunction (X1)**

Scientific Organizers: Tony Koleske, Yimin Zou, Kristin Scott and A. Kimberley McAllister

Sponsored by Takeda Pharmaceutical Company Limited

**Connectomics (X2)**

Scientific Organizers: Olaf Sporns, Danielle Bassett and Jeremy Freeman

March 5-8, 2017 • Eldorado Hotel & Spa • Santa Fe, New Mexico, USA

Sponsored by Merck & Co., Inc. and Takeda Pharmaceutical Company Limited

**Abstract & Scholarship Deadline:** November 3, 2016 / **Abstract Deadline:** December 7, 2016 / **Discounted Registration Deadline:** January 11, 2017

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**Keynote Address (X1)**

*Yimin Zou, University of California, San Diego, USA*

Plasticity of Spine Synapses

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**Cellular Morphogenesis in the Nervous System (X1)**

*Hollis T. Cline, The Scripps Research Institute, USA*

John G. Flanagan, Harvard Medical School, USA

Local Translation in Axon Guidance

**Yimin Zou, University of California, San Diego, USA**

Signaling Pathways in Growth Cone Guidance and Synapse Formation

**Haruki Takeuchi, University of Tokyo, Japan**

Short Talk: Patterned, but not Synchronous Spontaneous Activity of Olfactory Neurons Regulates Olfactory Receptor-Specific Axon Sorting

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**Network Structure and Variability (X2)**

Anna Beyeler, University of Bordeaux, France

Functionality in Amygdala Circuits

**Tom Vaissiere, The Scripps Research Institute, USA**

Short Talk: Structural and Functional Whole-Brain Mapping in a Model of Syngap1-Related Brain Disorders

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**Poster Session 1**

TUESDAY, MARCH 7

**Synapse Development and Function (X1)**

*Tony Koleske, Yale University, USA*

Jessica A. Cardin, Yale School of Medicine, USA

Developmental Dysfunction of VIP Interneurons Impairs Cortical Circuits

**Michael E. Greenberg, Harvard Medical School, USA**

Activity-Dependent Plasticity

**Elly Nedivi, Massachusetts Institute of Technology, USA**

Visualizing Synapse Structural Dynamics in vivo

**Bernardo L. Sabatini, Harvard Medical School, USA**

Activity-Dependent Regulation of Synaptic Plasticity

**Eunkyung Lie, Institute for Basic Science, South Korea**

Short Talk: Regulation of Excitatory Synapses by the Synaptic Adhesion Molecule SALM4

**Matthew B. Dalva, Thomas Jefferson University, USA**

Short Talk: Synaptic Nanomodules Underlie the Organization and Plasticity of Spine Synapses

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**Patterns of Brain Dynamics (X2)**

*Randy McIntosh, University of Toronto, Canada*

Matteo Carandini, University College London, UK

Recording from 10,000 Neurons to Test Two Theories of Cortex

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*Sridevi V. Sarma, Johns Hopkins University, USA*

Fragility in Epileptic Networks: The Epileptogenic Zone

**Michael Breakspear, Queensland Institute of Medical Research, Australia**

Brain Waves: Mechanisms of Metastable Cortical Dynamics

**Anees Abrol, University of New Mexico, USA**

Short Talk: Replicability of Dynamic Connectivity Patterns in Resting State of Human Brain

**Ben D. Fulcher, Monash University, Australia**

Short Talk: Structural Connectome Topology Relates to Regional BOLD Signal Dynamics

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**Workshop 2: Identification and Characterization of Cells and Projections (X1)**

*Yimin Zou, University of California, San Diego, USA*

Ken Burke, University of California, San Francisco, USA

Input-Specific Dopaminergic Modulation of Gain at Long-Range Inputs to Medial Prefrontal Cortex

**Aaron D. Levy, Yale University, USA**

SHP2 Inhibits GluN2B-Containing NMDA Receptor Function and Regulates Learning and Memory

**David E. Leib, University of California, Santa Cruz, USA**

Molecular Identification of Active Neurons Defined by FOS Expression or Phosphorylation of ERK1/2

**Jinyue Liu, Harvard Medical School, USA**

Transcriptional Determination of Laminar Identity for Retinal Ganglion Cell Dendrites

**Pushpanathan Muthuirulan, NICHD, National Institutes of Health, USA**

Mapping Neuropeptide Receptors to the Active Synaptic Circuits by Fluorescence Complementation

**Smita Yadav, University of California, San Francisco HMI, USA**

Role of Autism Susceptibility Gene TAOK2 Kinase and its Novel Substrates in Synaptogenesis

**Ryoji Amamoto, Harvard Medical School, USA**

Adult Axolotls Can Regenerate Original Neuronal Diversity in Response to Brain Injury

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**Support Cells and ECM (X1)**

*Matthew B. Dalva, Thomas Jefferson University, USA*

Cagla Eroglu, Duke University Medical Center, USA

Control of Synaptic Connectivity by Astrocytes

**Yi Zuo, University of California, Santa Cruz, USA**

Astrocytic Contributions to Synaptic and Learning Abnormalities in a Mouse Model of Fragile X Syndrome

**Tony Koleske, Yale University, USA**

Intersection of Adhesion- and Activity-Based Mechanisms in the Control of Synapse Maturation and Stability

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* Session Chair † Invited but not yet accepted

Program current as of July 17, 2019 Program subject to change. Meal formats are based on meeting venue. For the most up-to-date details, visit www.keystonesymposia.org/17X1 and www.keystonesymposia.org/17X2.
Behavior and Cognitive Architectures (X2)

“Sridevi V. Sarma”, Johns Hopkins University, USA
Sophie Aimon, University of California, San Diego, USA
Probing Large-Scale Network Dynamics at High Speed in the Brain of Behaving Flies

Randy McIntosh, University of Toronto, Canada
Moving from Mental States to Mental Processes via Connectome-Based Brain Simulation

Damien Fair, Oregon Health and Science University, USA
Typical and Atypical Development of Human Brain Networks

Marta Costa, University of Cambridge, UK
Short Talk: Leveraging Light-Level Image Data to Build the Mushroom Body Connectome of the Adult Fly

Neural Circuit Development and Function (X1)

“Yimin Zou”, University of California, San Diego, USA
Liqun Luo, Stanford University, USA
Wiring Specificity in Neural Circuit Assembly

Sreekanth Chalasani, The Salk Institute for Biological Studies, USA
Neuromodulatory Control of Chemosensory Processing in C. elegans

Kristin Scott, University of California, Berkeley, USA
Feeding Decisions in Drosophila

Zhigang He, Children’s Hospital, Boston, USA
Rebuilding Functional Circuits after Injury

Nicole Calakos, Duke University Medical Center, USA
Short Talk: Striatal circuit mechanisms for Habit and Compulsion

Chen Ran, Harvard University, USA
Short Talk: Spinal Cord Circuit for Thermosensation and its Reorganization in Persistent Pain

Big Data Challenges and Integration (X2)

Randal Burns, Johns Hopkins University, USA
Data-Intensive Applications: The OpenConnectome Project

Neda Jahanshad, IGC, INI, Keck School of Medicine University of Southern California, USA
Mapping Brain Variability and Heritability in Human Populations

Danielle S. Basset, University of Pennsylvania, USA
Structural and Functional Network Drivers of Individual Differences in Cognition

Manish Saggar, Stanford University, USA
Short Talk: Revealing the Shape of Brain Dynamics during “Ongoing” Cognition

Robyn Miller, Mind Research Network, USA
Short Talk: Statistical Stationarity, Temporal Epochs and fMRI Network Dynamics

Workshop 3: Synapse Development (X1)

“A. Kimberley McAllister”, University of California, Davis, USA
Kenneth Myers, Emory University, USA
LiM and SH3 Protein-1 Regulates Dendritic Spine Development

Akiyoshi Uezu, Duke University, USA
Unraveling the Inhibitory Synapse Proteome in vivo

Thomas Schaffer, Johns Hopkins University School of Medicine, USA
PKCepsilon Inhibits Dendritic Spine Development in Hippocampal Neurons by Activating the Developmentally-Regulated RhoA GEF Exph5

Anna R. Moore, Brandeis University, USA
Rem2 Regulates Distinct Homeostatic Mechanisms in Visual Circuit Plasticity

Xiangling Meng, Baylor College of Medicine, USA
Neurexophilin 4 Regulates the Function of Synapses in the Central Nervous System

Vinita Bharat, European Neuroscience Institute Göttingen, Germany
Capture of Dense Core Vesicles at Synapses by JNK-Dependent Phosphorylation of Synaptotagmin-4

Clarissa Waite, Columbia University, USA
Essential Role for Parkin in AMPA and NMDA Receptor Trafficking and Signaling

Ogul Ersin Uner, University of Pennsylvania, USA
Investigating Molecular Compensation in SAP97 Neuronal Knockout Mice

Workshop 2 (X2)

*Olaf Sporns*, Indiana University, USA
Navin Pokala, New York Institute of Technology, USA
Quantitative Prediction of Neural Network State Behaviors

Julio I. Chapeton, National Institutes of Health, USA
Functional Networks Exhibit Consistent Timing and Stable Connectivity in the Human Brain

Payel Das, IBM, USA
Relationship between Static and Dynamic Brain Functional Connectivity in Autism Spectrum Disorders

Karolina Finc, Nicolaus Copernicus University, Poland
Default Mode Network Role in Global Workspace Formation During Increasing Cognitive Demands
Leonardo Gollo, QIMR Berghofer Medical Research Institute, Australia
Hierarchical Timescales in the Brain: Structure-Dynamics Interplay, Perturbations, and Tuning Curves

Jin Liu, Beijing Normal University, China
Chronnectome Fingerprinting: Identifying Individuals Using Dynamic Functional Brain Connectivity

Michael Craig, University of Cambridge, UK
Network-level structural optimality using Nash Equilibrium Network Models

Melanie Weber, Princeton University, USA
Curvature-based Analysis of Connectivity Structure in Brain Networks

Neuronal Dysfunction Function in Disease (X1)
* Kristin Scott, University of California, Berkeley, USA
  iPSC Models for Drug Discovery for Neurodevelopmental, Psychiatric and Degenerative Disorders

Guo-li Ming, University of Pennsylvania, USA
Modeling 15q11.2 Genetic Risk for Psychiatric Disorders

A. Kimberley McAllister, University of California, Davis, USA
Immune Signaling in Neurons in Schizophrenia and Autism

Seth Taylor, University of California, San Diego, USA
Short Talk: Micro-RNA 218 Regulates Hippocampal Development through Age-Dependent Effects on Early Postnatal Synchronized Activity

Computational Models and Theory (X2)
* Randal Burns, Johns Hopkins University, USA
  Learning Mesoscale Models of Neural Computation

Thomas Dean, Google, USA

Olaf Sporns, Indiana University, USA
From Connectomics to Network Neuroscience

Meeting Wrap-Up: Outcomes and Future Directions (X1)
* A. Kimberley McAllister, University of California, Davis, USA

Meeting Wrap-Up: Outcomes and Future Directions (Organizers)

THURSDAY, MARCH 9
Departure