

**Program**  
**Winter Conference on Learning and Memory**  
**Friday January 3-Monday January 6, 2014**  
**Park City, Utah**

**FRIDAY JANUARY 3**

*Registration 3:00 -4:00 p.m.*

**Session 1:** Dave Olton Data Blitz

**Time:** 4:00 to 6:00 p.m.

**Location:** Prospector 1-2

**Organizer:** Paul Frankland (The Hospital for Sick Children)

**Description:**

If you would like to present at this session, please e-mail Paul at [paul.frankland@sickkids.ca](mailto:paul.frankland@sickkids.ca) with the title of your presentation. Presentation limited to 5 minutes, including discussion. Limit of 1 slide with a single panel

**PIZZA PARTY:**

**Time:** 6:30 -8:00 p.m.

**Location:** Atrium

**Session2:** Hippocampal-Prefrontal synchrony in learning and memory processes

**Time:** 4:00-6:00 p.m.

**Location:** Prospector 1-2

**Organizer:** Amy Griffin (University of Delaware)

**Description:**

Historically, the approach taken to identify the neural mechanisms of learning and memory has been to focus on dissociations among learning and memory systems. However, new evidence is emerging that suggests that these processes are emergent properties of functional interactions between disparate brain regions. Consequently, interest in dissociations among learning and memory systems has given way to the substantially different approach of investigating interactions within these anatomically and functionally connected networks. The functional interactions between the hippocampus (HC) and prefrontal cortex (PFC) have recently attracted attention due to their known anatomical connections, the strong correlation between

HC-PFC synchrony and working memory demand and the demonstrations that HC-PFC disconnection impairs spatial working memory task performance. The aim of this session is to bring together experts studying HC-PFC synchrony in freely moving rodents to hear about their most recent findings. We will discuss the mechanisms of HC-PFC functional interactions and the link between HC-PFC synchrony and learning and memory processes, including how disruptions in HC-PFC synchrony may lead to learning and memory impairments.

**Speakers:**

**Joshua Gordon** (Columbia University)

“The role of thalamic and hippocampal inputs to the prefrontal cortex in working memory and schizophrenia”

**Amy Griffin** (University of Delaware)

“TBD”

**Francesco Battaglia** (Donders Centre for Neuroscience)

"Cortico-hippocampal cell assembly formation during sleep and wakefulness”

**Matthew Shapiro**( Mount Sinai Hospital)

“Network handshaking in mPFC and CA1 during spatial learning”

**SATURDAY JANUARY 4**

**Session 3: False recognition in Alzheimer’s disease: Translation from animal models to the clinic (and back)**

**Time:** 4:00-6:00 p.m.

**Location:** Prospector 1-2

**Organizers:** Lisa Saksida (Cambridge University)  
Andrew Budson (Boston University)

**Description:**

Alzheimer’s disease is commonly regarded as a loss of memory for past events. However, Alzheimer’s patients seem not only to forget events, but also express false confidence in remembering events that have never happened. How and why false recognition occurs in such patients is currently a subject of debate, and treatments targeting this specific mnemonic abnormality have not been attempted. Examining converging and complementary studies of patients with Alzheimer’s disease, mild cognitive impairment, and medial temporal lobe amnesia with behavioral and electrophysiological studies in animal models, we will explore the evidence for false recognition in Alzheimer’s disease, the mechanisms—both psychological and neurobiological—that may underlie this phenomenon, and the possibility of using false recognition as a window into potential therapies.

**Speakers:**

**Andrew Budson** – (Boston University)

**Lisa Saksida** – (Cambridge University)

**Kei Cho** – (Bristol University)

**Morgan Barense** – (University of Toronto)

**Dinner:** Check out the new eateries in town.  
6:00-8:00 p.m.

**Session 4: Visualizing and manipulating the memory trace**

**Time:** 8:00-10:00 p.m.

**Location:** Prospector 1-2

**Organizer:** Sheena Josselyn (Hospital for Sick Children, University of Toronto)

**Description:**

A fundamental goal of neuroscience is to understand how the brain encodes and stores information. Historically, neuroscientists have focused on understanding the nervous system using the individual neuron or synapse as its focus of analysis. However, as pointed out by Richard Morris and colleagues (*Annual Review of Neuroscience*, 2000), “it is a big leap from the synapse to the behaving animal—and the chasm in between is the neural network”. Therefore, an ideal way to understand the neural basis of memory is to identify and manipulate these specific memory circuits (or traces) in intact, behaving animals. Until very recently, however, studies of this kind were not possible. However, the development of new tools is now allowing researchers to conduct these studies. The purpose of this symposium is to present recent work that uses these exciting new tools to examine how neuronal systems mediate different types of memory.

This symposium will bring together investigators who have made important contributions in visualizing and manipulating the memory trace. Each investigator uses a unique set of approaches (molecular, neurophysiological, imaging, optogenetic, pharmacogenetic, behavioral, and computational techniques) to examine memory. However, both the approaches and the questions are complementary and therefore, provide an integrated overview of this subject.

**Speakers:**

**Joshua Johansen** (RIKEN Brain Science Institute)

**Alcino Silva** (University of California, Los Angeles)

**Mark Mayford** (Scripps, University of California, San Diego)

**Sheena Josselyn** (University of Toronto)

## **SUNDAY, JANUARY 5**

### **Session 5: Embedded circuits in emotional memory processes**

**Time:** 4:00-6:00 p.m.

**Location:** Prospector 1-2

**Organizer:** Roger Clem (Mount Sinai School of Medicine)

#### **Description:**

Much has been revealed about the brain regions and biochemical events required for emotional memory. However, it is clear that while different emotional behaviors sometimes share regional molecular requirements, they selectively engage specialized circuits embedded within a broader limbic network. This selective wiring of neurons yields parallel processing and may facilitate the flexible encoding of conditioned emotional responses. The advent of powerful new techniques has allowed researchers to peer into these networks with unprecedented clarity, helping to reveal how plasticity within discrete circuits can have profound effects on behavior. This symposium will describe some of the most recent of these endeavors that are expanding our appreciation of the cellular and synaptic basis of memory.

#### **Speakers:**

**Roger Clem** (Mount Sinai School of Medicine)

**Bo Li** (Cold Spring Harbor Laboratory)

**Kay Tye** (MIT)

**Cyril Herry** (University of Bordeaux)

**Dinner:** Check out the new eateries in town!  
6:00-8:00 p.m.

**Session 6: Beyond the hippocampus: medial temporal cortices' mnemonic functions and vulnerability to age-related decline**

**Time:** 8:00-10:00 p.m.  
**Location:** Prospector 1-2

**Organizer:** Michael A. Yassa (Johns Hopkins University)

**Description:**

There has been a growing interest in the mnemonic functions of the medial temporal cortices outside of the hippocampus. While it is clear that the perirhinal, entorhinal and parahippocampal/posrhinal cortices play critical roles in service of long-term memory, the exact computational functions of these regions remain to be elucidated.

Electrophysiological recordings in the two subdivisions of the entorhinal cortex, for example, have shown strong spatial coding signals (i.e. grid cells) in the medial portion (MEC) but not the lateral portion (LEC). More recent work has suggested that LEC neurons may be coding for objects or rather the “world out there” which, together with spatial signals in MEC could provide input to drive hippocampal computations. This division of labor extends to the perirhinal (PRC) and parahippocampal/posrhinal (PHC/POR) cortices where PRC has demonstrated sensitivity to input changes in the object domain whereas PHC/POR has demonstrated sensitivity to input changes in the spatial or contextual domain. Furthermore, studies in aged rats have strongly suggested that the PRC-LEC pathway but not the POR-MEC pathway may be selectively vulnerable to age-related cognitive decline. Behavioral and neuroimaging studies in humans have also supported similar conclusions. The goals of this session are: (1) shed some light on the different computations in PRC-LEC and PHC-MEC and how they come together to provide object-in-context input for hippocampal processing, and (2) discuss recent cross-species data on how some but not all of these extrahippocampal regions change with age and whether these changes are predictive of cognitive decline.

**Speakers:**

**Michael A. Yassa** (Johns Hopkins University)

**Sara Burke** (University of Arizona)

**Jim Knierim** (Johns Hopkins University)

**Michela Gallagher** (Johns Hopkins University)

**MONDAY, JANUARY 6**

**Session 7: Memories, decisions and hippocampal activity**

**Time:** 4:00-6:30 p.m.  
**Location:** Prospector 1-2

**Organizer:** Loren Frank (University of California, San Francisco)

**Description:**

Hippocampal activity is known to contribute to learning, memory retrieval and spatial navigation. The way in which different patterns of activity contribute to different mnemonic and navigational functions has remained unclear, however. This session will highlight recent advances linking the expression of place cell sequences to memory formation and memory-guided decision making.

**Speakers:**

**A. David Redish** (University of Minnesota)

"Information processing in deliberative and non-deliberative decision-making systems in the rat"

**Loren Frank** (University of California, San Francisco)

"Neural substrates of memories and decisions"

**David Foster** (Johns Hopkins University)

"Hippocampal place-cell sequences and navigational decision-making"

**Business Meeting:**

**Time:** 7:00-7:15 pm

**Location:** Prospector 1-2

**Banquet**

**Time:** 7:30-11:00 pm

**Location:** Prospector 1-2

**SOCIAL ACTIVITIES:****DINNER**

January 3rd - Pizza Party - *For registrants or guests, no extra cost.*

January 4th - Dinner (on your own)

January 5th - Dinner (on your own)

January 6th - Banquet – *\$TBD for registrants and guests*

**Cash Bar:** *Friday, Saturday, Sunday evenings*

**Time:** 10:00 pm-12:00 am

**Location:** Timbers

