Center for the Neurobiology of
Learning & Memory
University of California, Irvine

MEMORY IS THE BRIDGE TO OUR PAST AND OUR FUTURE

NEURO TIMES

The newsletter of the
Center for the Neurobiology of
Learning and Memory

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Facts about the BRAIN:

- The average number of neurons in the human brain is 100 billion, compared with a chimpanzee which has 6.2 billion
- Your brain generates 25 watts of power while you're awake - enough to illuminate a light bulb
- There are approximately 100,000 miles of blood vessels in the brain

Inside this issue:

In the Spotlight

The CNLM is excited to announce that **Dr. John F. Guzowski** has been appointed the first James L. McGaugh Chair in the Neurobiology of Learning and Memory.

The fundraising campaign to endow the McGaugh Chair began in 2005, with the goal to raise at least $1.0 million dollars. Thanks to the generosity of our Friends, community members, and past and present faculty, staff and students, the campaign was a huge success. The Chair is named for Dr. James L. McGaugh, the founding director of the CNLM, to honor his enormous contributions to neuroscience, the CNLM, to UCI, and the local community. The title of McGaugh Chair is awarded to a CNLM faculty member at UC Irvine for a five-year term, in recognition of the high quality and importance of that professor's research program. The Chair carries with it funding that can be used to enhance the holder's research in a variety of ways, for example, by supporting a graduate student or junior researcher, or developing a new line of research to the point where it is ready to attract federal funding. Such funding will help our CNLM Fellows remain on the cutting-edge of brain research.

John F. Guzowski

John Guzowski has been a Fellow of the CNLM and a faculty member in the Department of Neurobiology and Behavior since October 2005. However, John has an even longer history with UCI and Jim McGaugh. He received his Ph.D. from the Department of Molecular Biology and Biochemistry here at UC Irvine in 1994 and subsequently worked as a postdoctoral researcher in the McGaugh laboratory, where Jim McGaugh was an influential mentor and helped shape John's scientific research perspective. Today, Dr. McGaugh is not only a close colleague and collaborator of John, but a friend and advisor.

John's research program focuses on understanding how genes activated by experience (learning) influence networks of cells involved in long-term memory storage, and how the interaction of such cell networks are involved in encoding and consolidating memories. John's laboratory is particularly interested in the role of immediate early genes (IEGs) in the cellular cascade required for creating and maintaining memory. IEGs are known to play a critical part in the memory process, but the exact mechanism by which they do so is just beginning to be understood. In addition to furthering our understanding of how memory works, the practical application of John's research program is to aid our understanding of cognitive impairment and diseases. John has a very strong scientific record as a pioneer in learning and memory research. He invented the "catFISH" (Compartmental Analysis of Temporal activity by Fluorescence *In Situ* Hybridization) method of using specific early genes to investigate the time-course of molecular changes associated with learning and plasticity. This technique has been an incredible benefit to our field and has spread to labs across the world for understanding brain circuit dynamics underlying a variety of behaviors

We are thrilled to celebrate the appointment of the Chair. The possibilities of John's research are endless, and the next five years should be very exciting for him and the CNLM.

A Pathway to New Research

In a paper published June 28, 2010 in the journal, *Proceedings of the National Academy of Sciences*, it was reported that a new technique had been developed using an ultrahigh-resolution MRI to electronically peer through dense matter near the brain's hippocampus in search of the perforant path. This technique was developed by researchers in the laboratory of CNLM Fellow, Dr. Craig Stark, and it will be used in their research to study how the brain and memory change with age and to enhance detection of Alzheimer's Disease in its earliest stages.

Scientists have struggled for decades to locate the tiny passage in humans called the perforant path. Studies of rodents have shown that it can deteriorate as part of normal aging and may be critical to our understanding of how our memory change with age and how researchers might differentiate normal aging from Alzheimer's disease. The perforant path is a bundle of nerve fibers, lined up like straws, connecting two key memory regions – a region called the entorhinal cortex to the seahorse-shaped hippocampus. By monitoring the brains of research subjects via their ultra-high-resolution technique – known as microstructural diffusion tensor imaging – Michael Yassa, Tugan Muftuler and Craig Stark were able to detect water molecules moving in the exact area where they knew the pathway should be. They then painstakingly tracked the progress of the molecules along the length of the fiber bundle, thereby identifying the perforant path and measuring its strength. Using the task, they confirmed that in normal brains the path weakens gradually with age and that this reduction is tied to how well participants could quickly recall details from their memory.

The study was supported by the National Science Foundation and the National Institute on Aging. With additional funding, the CNLM team is now expanding the study significantly. "We've seen the perforant path change with age and we've seen this is linked to at least one measure of memory", said Stark. "This provides one of the best links we've had to the large number of studies of aging in rodents and it gives us a new perspective on how and why our memory changes as we age." They're now focused on determining when the perforant path starts to degrade, how it affects the function of these memory regions and how it is differentially affected in the preclinical stages of Alzheimer's Disease. Tying together findings and ideas from different research areas – developing new technologies that push the boundaries of what we can learn about memory and the brain – it's what research in the CNLM is all about!

"Memory is a way of holding on to the things you love, the things you are, the things you never want to loose

-Kevin Arnold

Scientific Papers

Published papers are an important asset in the scientific world. It is through these papers that the free exchange of information between scientists takes place. Experimental findings are published as journal articles or book chapters, and are read by scientists all over the globe. Researchers then expand upon one another's work and publish subsequent findings. It is through this incremental process that science moves forward. Information exchange is not the only reason for researchers to publish. Particularly in an academic setting, the number and quality of publications is used to evaluate who will receive grants/monies from the government or from universities. Thus, papers are the lifeline of faculty and their lab personnel, as these publications determine the likelihood of continued funding and research. Papers are also used as a tool by the university when it comes to merit and promotion reviews.

Before a paper is published it must go through a rigorous peer review process. This review process is commonly organized by a journal or book editor, who enlists scholars in the author's field of research to evaluate a paper. These scholars must find the work of sufficient quality and originality to merit publication. Once the peer review is complete, the author must address any criticisms of the work and resubmit the paper until the reviewers and editor are satisfied and accept it for publication. It is rare that a paper is accepted without revisions required and, often times, more experiments or analyses are required to address criticisms. This arduous process ensures that researchers and the public receive scientific information that has been well vetted and is of good quality.

Despite huge state and University cutbacks, CNLM Fellows have published well over 50 scientific papers since the publication of our last newsletter. Our Fellows are competing well for grant monies and are actively engaged in ongoing and new experiments.

Director's Corner

Let me begin by introducing myself. My name is Craig Stark and I am the Interim Director of the CNLM. About three years ago, I moved to UCI from Johns Hopkins University, drawn out here by the CNLM and the fantastic neuroscience community we have here. This was not my first introduction to the CNLM, though. Of course, like others in our field, I knew the CNLM from its worldwide reputation for excellence in research on learning and memory. More directly though, I was a postdoctoral scholar in Larry Squire's lab (a UCSD-based CNLM Fellow) and would visit the Irvine campus for scientific meetings several times a year. I was very excited by the great science and collegiality I always found here. The interactions the CNLM fosters helped turn me into the scientist I am today. This makes for a wonderful feeling, now being here at the Center and getting to help lead the CNLM forward.

Craig E. L. Stark

We have a long tradition of not only being a place where fantastic science happens, but also a fantastic place to do science. By taking a coordinated, multidisciplinary approach to studying learning and memory, we can do things here that help move our field forward that other places cannot. What's more, we strive to reach out to young students and to the public at large to let them know what we and our colleagues are discovering about this most amazing structure, the human brain. We have a strong center that was built from the ground up by its members, working together under a vision that holds as true today as it was when we were founded almost 30 years ago. Our task as memory researchers is a monumental one, but a critical one. Memory is, after all, not only our bridge to our past, but also to our future. The CNLM has been pivotal in the advancements our field has made in the past. Stay tuned... there's a lot more to come!

Awards Wrap-up

Every year, UCI's Academic Senate Scholarly Awards and Honors Committee solicits nominations for seven distinctive awards that recognize outstanding teaching, research and service on the UCI campus. This year one of our CNLM Fellows, Dr. Frank LaFerla, was awarded The Daniel G. Aldrich, Jr. Distinguished University Service Award. This award is granted to respected scholars, who, at some point in their careers, have made outstanding contributions of service to the University of California.

CNLM graduate students Michael Yassa, Melissa Malvaez, Christine Charvet and Shawn Nielsen all received awards given through the School of Biological Sciences.

-Michael, graduate student of Dr. Craig Stark, was awarded the Fine Science Tools Graduate Travel Award, which is given to a graduate student to attend a national meeting, and is selected based on the quality of the student's submitted abstract. Michael is currently a postdoc in the Stark lab.

-Melissa, graduate student of Dr. Marcelo Wood, was awarded the William D. Redfield Graduate Fellowship Award which is given to a graduate student in the general area of molecular biology.

-Christine, graduate student of Dr. Georg Striedter, was given the Graduate Fellowship Award which is awarded to students close to completing their degree. Christine is currently a postdoc at Cornell University.

-Shawn, graduate student of Dr. Larry Cahill, was awarded the Edward Steinhaus Teaching Award, which is presented to outstanding graduate students in biological sciences courses with promising futures as educators.

All scholars received their awards at the Annual Honors Convocation Ceremony. The ceremony was followed by a reception where students were able to meet the donors who generously contributed funds for the scholarships and awards.

Graduate student Christopher Lay, of Dr. Ron Frostig's lab, was awarded the Emerging Scientist Award from the first annual Emerging Scientist Symposium sponsored by ReMinD, Research & Education in Memory Impairments & Neurological Disorders. The award is given to a graduate student who presents the best lecture about his or her research.

As usual the CNLM held our awards ceremony late this summer with many students to congratulate. The awards are:

Renée Harwick Advanced Graduate Student Award – The 2010 awardees are Maya Koike in the laboratory of Dr. Frank LaFerla and Matthew Korn in the laboratory of Dr. Karina Cramer.

Roger W. Russell Scholar's Award – The 2010 awardees are Michael Yassa in the laboratory of Dr. Craig Stark and Melissa Davis in the laboratory of Dr. Ron Frostig.

Carol Becker McGaugh Award – The 2010 awardee is Yas Sanaiha in the laboratory of Dr. Christine Gall.

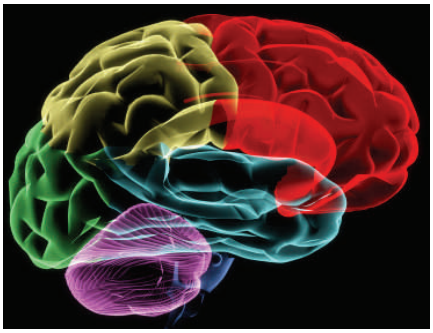
Friends of the CNLM Summer Awards for Undergraduates – The 2010 awardees are Heidi Negendank in the laboratory of Dr. Michael Rugg, Rohan Patel in the laboratory of Dr. Marcelo Wood and Ian Worden in the laboratory of Dr. Larry Cahill.

Friends of the CNLM Summer Awards for High School Students – The 2010 awardees are Katie Chou from Aliso Niguel HS, who will work in the laboratory of Dr. Karina Cramer, and Shannon Wongvibulsin from Trabuco Hills HS who will work in the laboratory of Dr. Claudia Kawas.

And the **Friends of the CNLM Foreign Graduate Student Award and the Renée Harwick Visiting Scholars Award** for 2010 is Holly Yeatman, a graduate student from the University of Melbourne, Australia. She will arrive from Australia in January 2011 and will work in the laboratory of Dr. Jorge Busciglio.

Congratulations to all our awardees!

Back row: Shawn Nielsen, Mike Yassa
Front row: Melissa Malvaez, Chris Lay



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Special Announcements

Ways you can become involved…

- **Join our Friends**
- **Become a tour docent**
- **Buy a brick on Memory Lane**
- **Support the SAVE OUR SERIES campaign**
- **Attend a scientific colloquium or public lecture**
- **Name a garden bench**
- **Visit our website:** http://www.cnlm.uci.edu

Become a Friend of the CNLM

A membership form for **2010-2011** is enclosed in this newsletter or you may find the form on our website at www.cnlm.uci.edu/friends

The Friends of the CNLM is our official support group. The purpose of the Friends group is to identify individuals in the community and university with a particular interest in learning and memory research and to establish an annual fund to be used for CNLM research and outreach including:

- Laboratory tours for schools
- Lectures and seminars for the community
- Special equipment for faculty
- Summer internships for students

Save the Date:

The 17th UCI Distinguished Lecture Series on Brain, Learning and Memory

January 18, 2011

March 16, 2011

May 11, 2011

Check our website soon for speakers!

All lectures are held at the Irvine Barclay Theatre

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