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FALL 2006

A quarterly publication of the CENTER FOR BEHAVIORAL NEUROSCIENCE

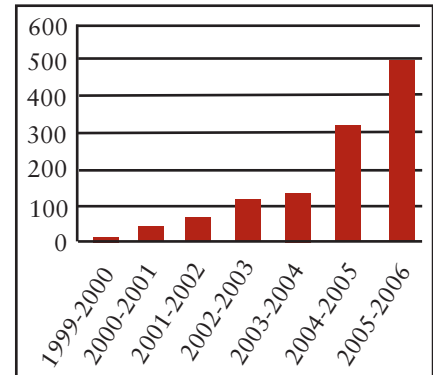
CBN Research Productivity Continues Sharp Climb

At the CBN's inception in 1999, its leaders set out to create a consortium of diverse colleges and universities united in the common goal of supporting research in behavioral neuroscience and creating a "team-based" research environment.

Not only did the CBN succeed in reaching these goals, but results have and continue to exceed expectations. As the Center heads into its eighth year as a National Science Foundation Science and Technology Center, CBN investigators have amassed an impressive amount of research funding and publication numbers, proving the Center has become a major funding and intellectual resource to the behavioral neuroscience community.

In 2006, the number of research publications produced by the Center's researchers increased 50 percent, continuing a striking record of a 50 percent increase each year since 2003. Also, within the last year, CBN researchers gave more than 408 professional presentations around the world, and more than 40 new grants were seeded through CBN support.

"These numbers are evidence that the Center has taken major steps toward our goal of forming a community of faculty and students from diverse institutions in Atlanta and supporting their research and education in behavioral neuroscience," said CBN Director Elliott Albers.



CBN Publications by Year: Total publications from CBN researchers at all institutions by grant year. Does not include published abstracts from conference presentations.

Another monumental accomplishment is the Center's record of leveraging venture funds into external funding. Since 1999, \$1.6 million in venture funds provided by the CBN has generated a whopping \$40 million in support from external sources for Center researchers.

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CBN Aids in Birth of Giant Panda Cub

Assays conducted by CBN researchers play a critical role in the birth of Zoo Atlanta's giant panda cub

On the afternoon of Sept. 6, 2006, three years of hard work paid off when Zoo Atlanta announced its giant panda, Lun Lun, had given birth to her first cub.

As the news spread, people around the world joined in the celebration, including a few investigators in the Center for Behavioral Neuroscience who began working with the zoo in late 2003 to aid the artificial insemination process in the giant panda.

"I am so happy Lun Lun had a baby," said Georgia State University's Mary Karom, laboratory supervisor for CBN Director Elliott Albers. "She certainly gave us a run for our money."

CBN joined the effort to artificially inseminate Lun Lun after attempts to naturally mate the female

panda and her male mate, Yang Yang, were unsuccessful. Albers offered his lab's assay services to improve the efficiency of the estrogen testing process.

In the fall of 2003, Karom met with Zoo Atlanta Curator of Giant Panda Research and Management, Dr. Rebecca Snyder, and soon began working to validate a commercial kit that would determine Lun Lun's peak ovulation period in just a matter of hours as opposed to days.

Previously, the San Diego Zoo measured Lun Lun's daily estrogen levels, but due to the distance from Atlanta, the results would often not be available for a few days. Because pandas only go into estrus once a year,

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Zoo Atlanta's female giant panda cub receives her weekly checkup. Photo courtesy of Zoo Atlanta

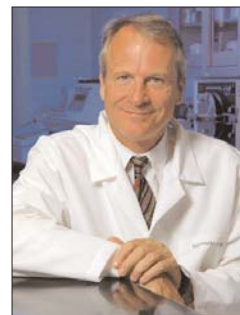
Another Great Year for the CBN

In 2006, for the third straight year, the number of research reports published by CBN faculty increased 50 percent. Also, external funding to CBN faculty, as a result of research seeded by CBN venture grants, surpassed the \$40 million mark.

The Center's major presence at the Society for Neuroscience annual meeting in October was a testament to our contributions to the field. More than 150 faculty and students presented papers during the conference and, for the first time in its history, the CBN sponsored an exhibit booth.

On Nov. 8, 2006, a team of scientists and educators from around the United States, as well as staff from the National Science Foundation conducted its annual site visit to access the Center's progress and again commended the CBN on its work, stating the Center has made a "major contribution to the community of behavioral neuroscientists."

I wish to take this opportunity to thank all of our faculty, staff, students, supporters, and community partners who worked so hard on CBN activities over the last year. We realize our accomplishments wouldn't be possible without your help and support.



H. Elliott Albers

Research Productivity

Continued from page 1

"CBN venture grants and postdoctoral fellowships have provided a wonderful mechanism for developing novel research projects and for generating critical preliminary data needed to make our NIH grants competitive," said CBN Researcher Larry Young, Ph.D., of Emory University.

CBN Researcher Jocelyne Bachevalier, Ph.D., of Emory University said venture grants have had a tremendous impact on her research program.

"Venture grants have provided me the opportunity to not only discover several insightful collaborators in the community, but have also allowed me to get critical pilot data that have already been used in a recent grant application to the NIMH. The CBN also provides a unique opportunity to develop translational research projects," Bachevalier said.

During its November site visit, a team from the NSF continued to be impressed with the CBN's efforts.

"Added value was clear in research, education and inclusion of

partner institutions. The CBN has continued to refine its mission of providing a new means of carrying out 'team-based' research. This broader mission is being realized as a major contribution to the community of behavioral scientists," the NSF team stated. "The CBN continues to be a very successful enterprise. The vision and implementation of the CBN has produced a cultural change and developed a successful model for conducting collaborative, interdisciplinary and multi-institutional scientific research."

During the last three years of NSF funding, the Center plans to continue to build on these successes, said Albers.

"We have in place many key elements that will allow us to forge ahead in attaining our goals," he said. "And, we will continue to build on our successes in neuroscience research, education and public outreach as we work to increase our national stature and impact." ■

Be on the lookout for...



TINA CHANG, PhD, Assistant Professor of Psychology at Morehouse College, studies environmental preference in human and non-human primates. Specifically, she is interested in how primates perceive the functional components of environmental objects and scenes, how function can be quantified in terms of the fractal structure in environments, and what role neural processes play in influencing spatial preference. Dr. Chang is a member of the Memory and Cognition Collaboratory.



STEFAN CLEMENS, PhD, Instructor-RT in the Department of Biomedical Engineering at Emory and Georgia Tech, is studying the organization and the functioning of the spinal networks that drive and modulate the sympathetic (autonomic) part of the nervous system. These neural circuits govern a wide range of involuntary functions in the body, but their modulatory impact is also dependent on the social status of the animal. In particular, Dr. Clemens is trying to understand the role of dopaminergic neuromodulation in the context of the functional and interactive plasticity found within the spinal cord.



MARK GOODMAN, PhD, is a Professor of Radiology and Psychiatry and Behavioral Sciences, Director of Positron Emission Tomography Core and Director of Radiochemistry at Yerkes National Primate Research Center at Emory University. His research is directed towards the development of new PET and SPECT ligands for the study and management of treatment of cocaine addiction, depression, dementia and psychomotor disorders. In addition, current research efforts are to develop brain imaging of CNS monoamine transporters, amyloid, CRF1, estrogen, PK1195, complex I, glutamate, oxytocin and vasopressin receptors.

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Evidence of Learning in Neurons

CBN Researcher Continues to Enhance New Neuroscience Technologies for Studying Learning and Memory In Vitro

Think teaching a puppy to sit or a child why it is important to eat their veggies before dessert is hard? Well, imagine trying to teach a few-thousand rat neurons grown atop a grid of electrodes to learn anything.

CBN Researcher Steve Potter, of Georgia Institute of Technology's Department of Biomedical Engineering, and his lab group, along with members of the CBN Innovative Technology Initiative took on such a challenge and, with continual advances in their research technologies, are moving ever closer to their goal of teaching the embodied cultured neurons (aka -- animats) to learn and to adapt to their environment.

The technology, computerized multi-electrode arrays (MEA), connects neural cells, such as cultured rat brain tissues, to robotic and computer-simulated bodies. The system allows the brain tissue to direct movements in the artificial body and adapt to virtual environments by developing new neural connections.

"The cultured nets can serve as the 'brain' of simulated animals or robotic creatures," Potter said. "By re-embodimenting cultured networks, we can allow them to express behaviors,

and, hopefully, to learn via interactions with their environment."

Since 2002, the team has developed a two-photon microscope that penetrates deeper into living brain tissue than any other microscope is capable of doing in order to observe the growth of neurons and the formation of connections.

"The designing and building of the microscope was done by myself and two people in my lab (graduate student Komal Rambani and CBN postdoc Mark Booth) with funding from the CBN and the Georgia Research Alliance," Potter said. "It is now working and allows us to see twice as deep into brain tissue than confocal microscopes, but we still plan to continue to add new capabilities."

The team also developed a nutrient delivery system that can keep alive tissues containing millions of cells, such as brain slices, allowing studies of much more complex three-dimensional neural networks over many months.

"We have recently gotten some good results helping thick brain slices stay alive longer in vitro using a porous substrate through which medium is perfused," Potter said. "There remains to test some 3D microfluidic culture devices made in



Multi-Electrode Array in hand

Photo courtesy of Steve Potter

Bruno Frazier's lab here at Georgia Tech. These are designed to deliver medium to the center of brain slices where necrosis tends to occur. These will help us use a much more realistic brain-like network to study learning and memory in vitro."

More recently, the team began work with open-loop experiments to explore what types of stimuli must be delivered to elicit lasting functional changes in the network, and to develop new metrics to measure neuronal activity and look for functional plasticity.

Potter says it is hard to predict when the animats will begin to learn.

"I think that it will take some more thought to determine how input-output mappings will translate open-loop plasticity experiments we have been doing into a closed-loop animat context," he said. "I expect that to happen in the coming year." ■

Giant Panda Cub

Continued from page 1

in March, and the peak mating period is a short window of only three or four days, it is critical to predict receptivity of the female for mating right away. Karom's assay and the close proximity of the CBN to the zoo made quick assay results a reality.

"I could run the assay using our kit and get results to Dr. Snyder in about four hours as opposed to days," Karom said. "With results this fast, they (the zoo staff) could compare behavioral and hormonal changes in Lun Lun on the same day

to determine optimal artificial insemination, and with only a three-day window for conception, this information was very helpful."

Snyder also composed graphs charting the daily hormone assay results. These graphs, developed in partnership with the CBN, were displayed to the public outside the panda exhibit as part of an information panel about giant panda reproduction.

"The panel explains that hormonal information provided by the CBN is

important for predicting ovulation and the birth window for Zoo Atlanta's female giant panda, Lun Lun," Snyder said. "The panel also allows us to display a chart of the female's hormone profile, so visitors can track her progress during estrus and possible pregnancy. This chart is updated daily during estrus and weekly during possible pregnancy. It's very popular with zoo visitors and helps people to understand the science behind giant panda reproduction." ■

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CBN Has A Big Presence at SFN's 36th Annual Meeting



Aaron Jasnow, Ph.D., a CBN postdoctoral fellow at Emory University, shares his experience and knowledge of the CBN with those who visit the Center's exhibit.



Above: Attendance at the "Oxytocin, Vasopressin and Emotional Regulation" symposium was booked to capacity weeks before the SFN meeting.

Left: Hillary Schwarb, a CBN graduate student at Georgia Tech, hands out CBN stress balls and the "Local's Guide" to booth visitors.

Photos by Rob Poh

Faculty, students and partners of the Center for Behavioral Neuroscience joined forces to create an impressive CBN presence at the 36th Annual Meeting of the Society for Neuroscience, which took place Oct. 14-18, 2006, at the Georgia World Congress Center in downtown Atlanta.

CBN activities began two days before the conference with two pre-SFN symposia sponsored in part by the Center. The symposia, "Molecular and Behavioral Basis of Addiction," organized by Mike Kuhar of Emory and "Oxytocin, Vasopressin and Emotional Regulation," organized by Larry Young of Emory, brought in more than 225 attendees.

During the SFN meeting, more than 150 CBN faculty and students presented posters and platform papers. The Center also teamed with the Atlanta Chapter of the Society for Neuroscience to sponsor 32 undergraduate travel awards. These awards paid the way for undergraduate students to benefit from the massive networking opportunities that were to be found in the crowd of more than 25,000 scientists.

For the first time in its history, the Center sponsored an exhibit booth at the SFN meeting. CBN stress balls and the CBN-created "Local's Guide to Dining and Entertainment in Atlanta," were two popular give-away items at the booth. The booth also featured brochures about the CBN's postdoctoral fellows, graduate scholars and undergraduate programs.

"The CBN would like to thank all of our members who worked to make the 2006 SFN meeting a rewarding experience for our Center," said CBN Director Elliott Albers. ■



Two children watch with anticipation as more than 20 volunteers work to inflate the world's largest brain. Almost 100 volunteers worked to make the Brain Balloon Project, coordinated by CBN Educator Kyle Frantz, a success. Photo courtesy of GSU Photographer Carolyn Richardson.

GSU: Where the Great Brain Reigns

Atlanta area neuroscientists host the Brain Balloon Project

Atlanta area families flocked to the corner of Decatur and Piedmont Streets on the campus of Georgia State University, Saturday, Oct. 14, 2006, to catch a glimpse of the world's largest brain – a nine-story hot air balloon shaped and color-coded by functional regions of the brain.

Area neuroscientists, including members of the Center for Behavioral Neuroscience, teamed to bring the giant brain to Atlanta and raise awareness about neuroscience, the brain and brain disorders.

In addition to an awe-inspiring view of the towering balloon, visitors participated in hands-on, "minds-on" neuroscience activities and enjoyed an educational "What's in the Doctor's Bag" show by Dr. Neil Shulman of Emory University.

The Brain Balloon is owned and operated by The International Brain Foundation. For more information on the balloon visit: www.brainballoon.com.

60% of children who attended the Brain Balloon Project said, as a result of attending the event, they were interested in learning more about the brain and brain disorders.

Congratulations to Mt. View Elementary School Teacher **Janie Stokes**, winner of the Brain Balloon Headline Contest with her entry: **GSU: Where the Great Brain Reigns**

CBN Names Director of Undergraduate Education

Dr. Karen Falkenberg joins the CBN from Emory University

CBN has added a new face to its staff. Dr. Karen Falkenberg has joined the CBN as the Director for Undergraduate Education where she will oversee the Center's undergraduate education and research programs.

Dr. Falkenberg comes to the CBN from Emory University where she is an instructor in the Division of Educational Studies. She also serves as president of the Education Division of Concept Catalysts Inc., a consulting company specializing in science, mathematics and engineering education reform.

After earning her doctoral degree in educational studies from Emory University, Dr. Falkenberg worked as a science, mathematics and engineering high school teacher and was involved in case studies on innovations in science, math and technology education. She later served as the program manager for a National Science Foundation funded local educational initiative called the Elementary Science Education Partners Program (ESEP), and has served as a mentor for such professional programs as the Leadership Academy of the Eisenhower Consortium for Mathematics and Science, and the National Science and Mathematics Education Leadership Academy for Science and Mathematics Educational Reform.

As a proven leader in science education, Dr. Falkenberg will bring valuable educational experience to the CBN. ■



Falkenberg

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CHUMA OKERE, PhD, assistant professor in the Department of Biological Sciences, Clark Atlanta University, studies the dynamics of

pheromone-dependent synaptic mechanisms underlying the formation of olfactory recognition memory in mice. In addition, he is interested in understanding how olfactory bulb-hypothalamic pathways, particularly the nitric oxide synthase-containing domain regulate the process of parturition and maternal behavior in rats. Of particular interest is determining how the robust nitrenergic system in the caudal dorsal raphe nucleus (a region that contributes innervations to the forebrain stress-responsive circuit) functionally interacts with the mesolimbocortical stress circuit to mediate whole animal response to stress/anxiety-inducing stimuli. He will belong to the Reproduction, and Memory and Cognition Collaboratories.

No
Photo
Available

BINGHE WANG, PhD, Associate Professor of Chemistry at GSU, is a synthetic medicinal and bioorganic chemist with research interests in the

general areas of (1) design and synthesis of small molecule compounds as potential pharmaceutical and/or biological agents, (2) development of fluorescent sensors and new diagnostic agents, and (3) chemical biology aimed at using small molecule compounds to probe pathways and mechanisms important to the functions of various biological systems. Dr. Wang will be joining the Affiliation Collaboratory.

CBN Seeks ION Assistant Director

The Institute On Neuroscience (ION), an eight-week summer research experience for high school students, invites applications for the position of Assistant Director in 2007. Responsibilities include reviewing applications and interviewing candidates (4-5/07), planning curriculum (based on an established model, 5-6/07), leading instructional activities full-time during the introductory segment of the program (6/11-6/29/07), guiding weekly workshops in the remainder of the program (7/6, 7/13, 7/20, 7/27, and 8/3/07), and evaluating program outcomes (8/07). Successful applicants will be individuals who are interested in active approaches to teaching and learning, and also have experience with laboratory research and scientific writing. Applicants with a Ph.D. in neuroscience or a related field are preferred, and at least a Master's Degree (or equivalent graduate work) is required. Salary based on experience. Please submit curriculum vitae, a brief statement of interest in neuroscience education, and contact information for three references to Program Director, Dr. Kyle Frantz, via e-mail (kfrantz@gsu.edu) with "ION Search" in the subject line. Application review will begin Jan. 31, 2007 and continue until the position is filled. ■

CBN Unveils New Website



CBN is pleased to announce the Center's new website, which was recently redesigned to better meet the needs of CBN faculty, students and those checking in to find out what the Center is all about.

New additions include a quick links menu for fast access to frequently used pages such as: membership and venture grant applications, CBN directories, frequently asked questions, and graduate and postdoctoral opportunities. There is also a new Bulletin Board section where visitors can find information regarding faculty, postdoctoral and laboratory technician positions available at CBN partner institutions. Check out the new site at: www.cbn-atl.org. ■

Synapse Fall 2006
Vol. 7, No. 4

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