Synapse

SUMMER 2009 A quarterly publication of the CENTER FOR BEHAVIORAL NEUROSCIENCE

What's inside

CBN Summer Camps Introduce Young Minds to Neuroscience

Brain Camp for Kids Open House gives participants the opportunity to teach their parents and siblings what they learned about neuroscience during the week-long camp for middle school students. *See page three for more photos from Brain Camp, ION, BRAIN, and the Teacher Workshop at Zoo Atlanta.*

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Fat Cells Talk to Brain, Claim Siberian Hamsters

CBN researchers at Georgia State University have found that fat cells give feedback to the brain in order to regulate fat burning much the same way a thermostat regulates temperature inside a house. With an increase in obesity threatening the health and life expectancies of people across the world, the research may help scientists better understand how weight is shed.

C. Kay Song and Tim Bartness of Georgia State, along with Gary J. Schwartz of the Albert Einstein College of Medicine, found that during the process of burning fat - called lipolysis - fat cells use sensory nerves to feed information to the brain. Using viruses to trace communication among the nerves of Siberian hamsters, they found that the brain, in turn, communicates back to the cells to initiate, continue, or stop the fat burning depending upon the information

Tim Bartness, Ph.D.

the brain receives from the fat.

"The brain can trigger lipid burning by fat cells through the sympathetic nerves going from the brain to fat and then the sensory nerves can inform the brain of how much fat has been mobilized," Bartness explained. "This is a really important concept in biology, as it

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BRAIN Enjoys Success While Looking to the Future

The expanded Behavioral Research Advancements in Neuroscience (BRAIN) program welcomed 20 additional undergraduates from academic institutions across the country this year for a total of 38 students.

BRAIN was able to double its size this summer due in part to a $1.2 million grant from the National Institute of General Medical Sciences (NIGMS), along with continuing support from the Center for Behavioral Neuroscience, DANA Alliance for Brain Initiatives, and FACES (Facilitating Academic Careers in Engineering and Science). This support helped to fund education research comparing two different summer program models: the traditional apprenticeship (RightBRAIN) vs. a professional workshop model (LeftBRAIN) in which students work in teams to explore neuroscience techniques and research questions in a dedicated lab facility.

"The experience was great. The big group of students brought varying levels of neuroscience experience, varying interests, and varying personal styles, all of which made the program more exciting," said Kyle Frantz, Ph.D., BRAIN Co-Director and Associate Professor of Neuroscience at Georgia State University. "We hope to host the same number of students next year. However, this depends on funding."

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Committed to Current Programs and Future Opportunities

By the time the next *Synapse* newsletter is mailed, the CBN's National Science Foundation Science and Technology Center grant will have ended, but our commitment to neuroscience education and our efforts to increase the visibility of neuroscience will still be alive and well.

I recently attended the 2009 NSF Science and Technology Centers Director's Meeting in Boulder, Colorado, hosted by the Center for Integrated Space Weather Modeling. During the meeting, I was able to share lessons learned with younger STCs and also meet with directors to discuss new opportunities for scientists and engineers to develop collaborations, which could lead to the creation of large scientific enterprises.

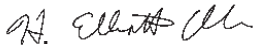
As new opportunities arise, it is important we continue to focus on the state of our current programs that enjoyed much success this year, and keep in mind that additional funding is needed for this success to continue in 2010.

Our Undergraduate Education Committee recently hosted an undergraduate networking event at Zoo Atlanta. The limited admission event was so successful students had to be placed on a waiting list to get in. Thanks to all who worked so hard to make it a great experience for our students. It is really inspiring to see such a variety of people from so many different organizations coming together to make these events work so well, and to see the growing interest in neuroscience among undergraduate students from Atlanta area institutions.

The BRAIN program also made great strides this year, doubling student participation with the help of a $1.2 million grant from the National Institute of General Medical Sciences. However, due to the end of our NSF funding, the BRAIN program, along

H. Elliott Albers, Ph.D.

with the Brain Camp for Kids, Brains Rule! Neuroscience Expo, and the Institute On Neuroscience programs, will require a large, concerted effort on all our parts to continue in 2010 and beyond. The CBN does not intend to end its educational efforts, and we hope that you all will continue with your own important contributions to these programs. ■



Fats Cells Talk to Brain

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can regulate the process of lipolysis much like how a thermostat regulates temperature in your house, using input from the air and output to a furnace or heating unit.

"The presence and function of the sensory nerves has been completely ignored and the areas in the brain that receive this sensory information were unknown until we did these studies," he said.

When the body has a low amount of a type of readily available fuel, a carbohydrate called glycogen that is in very limited supply even at its maximum, the body starts lipolysis to release energy stored in fats. At the end nerves which are part of the sympathetic nervous system, a chemical called norepinephrine is released to trigger the breakdown of fat.

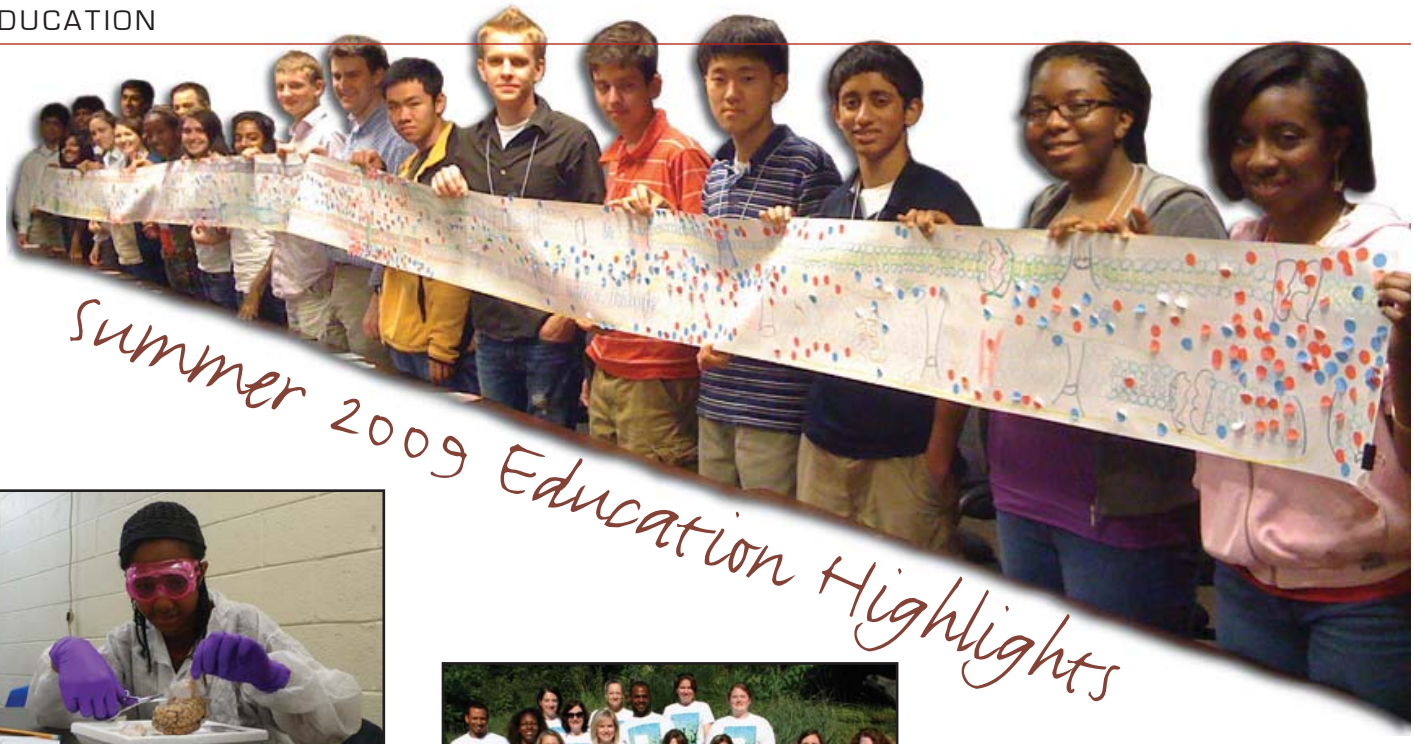
Sensory nerves then appear to report back to the brain to inform it of the status of the lipolysis, communicating whether too much or too little energy has been released - and the activity of theses sensory nerves can be adjusted accordingly.

"If you're doing a moderate amount of exercise or even if it has been a fairly long interval since you last ate, you will use up all or most of the available glycogen, necessitating the break down of fat to yield sufficient energy," he said. "But you don't want to break down more than you need so this would be a way to stop the sympathetic nervous system from triggering the release of too much lipid energy from fat."

Bartness said that though this communication process is known to play a role in the short-term burning of fat, researchers are not sure whether this process also is involved with the long-term issues of burning fat important in understanding obesity and why some people burn fat more readily than others.

"It could be that sensory nerves have a dual function," he explained. "In addition to the moment-to-moment lipolysis process, they might also have a longer term function. It's complicated, and it might be a different subset of the sensory nerves performing the long-term monitoring of fat reserves." ■

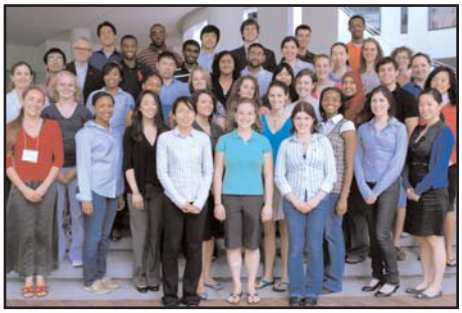
- Jeremy Craig
Georgia State University



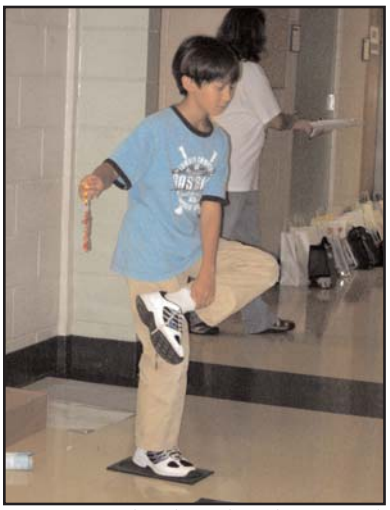
Summer 2009 Education Highlights

Sheep brain dissection is just one of the many hands-on activities students participate in during brain camp. *Photo courtesy: Jeremy Craig*

K-12 teachers from Georgia learn how to effectively teach neuroscience during the Animal Brain and Behavior Teacher Workshop at Zoo Atlanta.



BRAIN 2009 hosted 38 undergraduate students from academic institutions across the country. *Photo courtesy: Rob Poh*



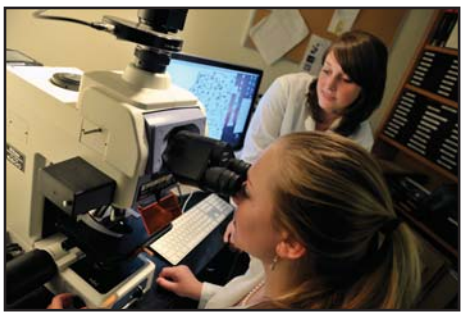
Brain Camp students learn about the senses and how they effect every aspect of their lives including balance.

Up-close demonstrations and behind-the-scenes tours give Teacher Workshop participants a unique look at Zoo Atlanta. *Photo courtesy: Carolyn Richardson*

Institute On Neuroscience (ION) Scholars conduct five-week mentored laboratory research projects at CBN member institutions. *Photo courtesy: Liz Weaver*

Top of page: ION Scholars create a giant axon to illustrate action potential. *Photo courtesy Chris Goode.*

Brain Camp participants teach an open house visitor what they learned about the eye during a week at camp.



Behavioral Research Advancements in Neuroscience (BRAIN) Fellows spend the summer working in Atlanta area neuroscience laboratories. *Photo courtesy: Meg Buscema.*

Undergraduates Flock to CBN Networking Event

More than 40 undergraduate students from across all CBN member institutions took part in the Center's annual undergraduate networking event at Zoo Atlanta, on Thursday, Sept. 17. Attendees were treated to a behind-the-scenes look at the Orangutan Learning Tree exhibit, led on a zoo scavenger hunt, and then treated to dinner and a special presentation by CBN's Undergraduate Committee Chair and Morehouse College Associate Professor of Psychology, Duane Jackson, Ph.D.
Photo courtesy: Rob Poh

CBN Member Receives MERIT Award

Georgia State University Regents' Professor of Biology and CBN member Tim Bartness, Ph.D., has received the prestigious Method to Extend Research in Time (MERIT) Award from the National Institutes of Health's Institute of Diabetes and Kidney Disease.

The multi-million dollar award will provide long-term funding for his lab's investigation into the biological mechanisms of obesity, which explores the communication loop between fat cells and the brain.

MERIT is among the most selective research grants given by the NIH, with less than 5 percent of NIH-funded investigators selected as recipients. Dr. Bartness is the first investigator at Georgia State University to receive the award.

- Jeremy Craig
Georgia State University

Celebrating CBN Member Achievement

Aditi Pai
CBN faculty, Spelman College
Presidential Award for Excellence in Scholarship, 2009

Sarah Brosnan
CBN faculty, Georgia State University
NSF Career Award (Five-year starting in 2009)

Heather Ross
CBN student, Emory University
Fellowship in Research and Science Teaching (FIRST), 2009

Jessica Raper
CBN student, Emory University
Fellowship from the Integrated Training in Psychobiology and Psychopathology (ITiPP), (Two-year award starting in 2009)

Nicole Victoria
CBN Student, Georgia State University
Travel Award to Attend the 2009 Early Life Programming meeting in Philadelphia, PA

Vasiliki Michopoulos
CBN student, Emory University
Ruth L. Kirschstein Pre-doc Fellowship Award from the NIH, 2009

Lisa Heimbauer
CBN student, Georgia State University
Georgia State University Language & Literacy Fellowship, (Two-year starting in 2009.

American Society of Primatologists (ASP) Travel Award, 2009

BRAIN Funding

Continued from page 1

Although the NIGMS grant will continue for three more years, without additional funding, the CBN will not be able to provide funding for student housing, etc., as it has done in the past.

"We hope CBN members will pitch in to help garner funding for BRAIN by writing proposals to supplement existing NIH or NSF grants," Dr. Frantz said. "We can provide the program structure, if you can provide the stipend and housing costs (approximately $5,500 per Fellow). BRAIN program coordinators are writing a template proposal into which CBN faculty members and senior research associates can place their specific research plans. If these proposals are successful, everyone wins."

While the biggest area of need is for CBN members to write supplementary grant proposals and subsequently serve as research mentors, there is also a need for advanced graduate students and post-doctoral fellows to teach in the LeftBRAIN program and for teachers to help out with the orientation curriculum and enrichment workshops.

It isn't too early to start thinking about BRAIN 2010. Applications for summer 2010 will be posted in late October with applications due in early February 2010.

"Please be on the lookout for that opportunity to sustain undergraduate offerings in Atlanta, and encourage any and all students genuinely interested in neuroscience to apply for BRAIN. No research experience is necessary," Dr. Frantz said. ■