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Georgia Biomedical Partnership Recognizes CBN's Public Education Efforts

Each year, the Georgia Biomedical Partnership recognizes individuals, companies or institutions for significant contributions to Georgia's life sciences industry with its Biomedical Community Awards. For 2006, the Center for Behavioral Neuroscience (CBN) was honored as a model for conducting nationally-recognized scientific research through a broad consortium of colleges and universities, and for its extensive efforts to increase scientific literacy. The CBN, a National Science Foundation (NSF) Science and Technology Center, coordinates research among more than 100 scientists from eight metro-Atlanta colleges and universities. It also provides educational opportunities for K-12 school students, science teachers, undergraduate and graduate students, and postdoctoral fellows. ■



CBN Director Elliott Albers receives the 2006 Biomedical Community Award from Georgia Biomedical Partnership President Charles Craig.

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Editor: Martha Barker

Synapse

SUMMER 2006

A quarterly publication of the CENTER FOR BEHAVIORAL NEUROSCIENCE

Stress Prompts Hamsters to Overeat

These rodents may hold the answer to battling human obesity

Pressures at work, conflicts in personal relationships, childcare demands and traffic snarls – many people deal with such day-to-day stress by overeating resulting in weight gain and obesity. Is there relief in sight?

CBN (Center for Behavioral Neuroscience in Atlanta, Ga.) researchers say Syrian hamsters may hold vital clues to curbing those unhealthy cravings.

Until now, rodents have not been useful as a model for human stress-induced obesity because the typical response of laboratory rats and mice to a wide range of stressors is to decrease food intake and body weight, but a CBN collaboration has found this isn't the case with Syrian hamsters.

In a study published in the May issue of the *American Journal of Physiology, Regulatory, Integrative and Comparative Physiology*,* GSU scientists Tim Bartness and Kim Huhman along with CBN graduate students, Michelle Foster and Matia Solomon, confirmed that not only do Syrian hamsters increase body and fat mass under social stress, but interestingly enough, most of the weight is gained in the abdominal area (visceral fat), making this species an ideal model for human stress-induced obesity.

The group conducted a series of resident-intruder sessions where they placed an 11-week-old hamster (subordinate intruder) in a cage with an older hamster (dominant resident). After several seven-minute trial periods, a clear dominance



Research conducted by GSU scientists Tim Bartness and Kim Huhman and CBN graduate students Michelle Foster and Matia Solomon finds Syrian hamsters may hold vital clues to battling human stress-induced obesity.

hierarchy developed between the hamsters where one of the animals showed subordination or "defeat" in the presence of the other.

The results of the study showed that social stress produced by subjecting Syrian hamsters to defeat reliably triggered increased food intake and body and lipid mass. Therefore, this form of social defeat, a natural stressor, mimics many of the effects of nontraumatic stress in humans by resulting in increased food intake and adiposity, including enhancement of visceral fat growth. A second paper recently accepted at *AJP*, indicates that in dominant-subordinate

Continues on page 3

CBN Prepares for SFN 2006

In October, the Society for Neuroscience Conference will bring almost 30,000 scientists from around the world to Atlanta for what has been called “the premier forum for the latest in neuroscience research,” and we are making plans to take advantage of this amazing opportunity.

With support from CBN faculty members and partners, we have put together a host of educational and research related opportunities that are sure to make our presence at the conference the largest ever.

On Thursday, Oct. 12, in partnership with the International Drug Abuse Research Society and Yerkes National Primate Research Center, we will host “Molecular and Behavioral Basis of Addiction” an SFN satellite symposium on the advances of drug abuse research organized by CBN faculty member Mike Kuhar.

We will once again team with Yerkes on Friday, Oct. 13, to sponsor another SFN satellite symposium entitled “Oxytocin, Vasopressin and Emotional Regulation: New Frontiers in Basic Neuroscience and Translational Opportunities,” co-organized by CBN faculty member Larry Young.

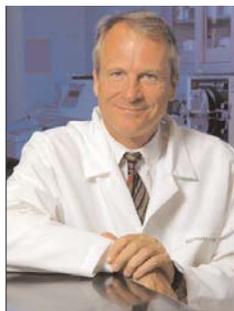
At the CBN, we understand the conference is a great networking opportunity not only for our researchers, but also our students. With that in mind, we have teamed with the Atlanta Chapter of the Society for Neuroscience to sponsor up to 40 undergraduate students from local Atlanta area universities who would like to attend.

As in previous years, our science educators will be presenting posters about CBN educational programs offered during the year. This year, we have the opportunity to present this information at the SFN Brain Awareness Week meeting on Oct. 15, which will focus on neuroscience public education with a talk by Director of the NIMH and former CBN Director, Tom Insel.

We are also pleased to announce that for the first time in its history, the CBN is sponsoring a SFN exhibit booth. Be sure to let everyone know our location -- booth 2742. In addition to plenty of informational brochures, squeezey brains, pens and mugs, we will also have on-hand copies of our much-anticipated “Local’s Guide to Dining and Entertainment in Atlanta.”

Unlike your average conference-dining guide, this book does not utilize paid advertisements and includes only local eating establishments and entertainment activities recommended by CBN faculty and staff. A copy of the guide will be posted on the CBN website a few weeks prior to the conference, and we will send the URL to our listserv so that you can forward it to your friends who will be visiting for the meeting.

The CBN would like to thank all of our members who are working to help us prepare for the conference. More information about the activities mentioned above may be found inside this newsletter or on our website: www.cbn-atl.org. ■



H. Elliott Albers

Be on the lookout for...



ALEC DAVIDSON, PhD, assistant professor in Morehouse School of Medicine’s Neuroscience Institute, studies the relationships between

the biological clock and health. Davidson’s current research questions ask: What is the role of host and tumor-based circadian rhythmicity in the development and treatment of cancers? What are the mechanisms and costs of the age-related breakdown of the circadian system? What are the mechanisms by which chronic jet-lag and simulated shift-work affect rodent health and longevity?



TIMOTHY DUONG, PhD, associate professor of Neurology at Emory University and Director of Magnetic Resonance Research at Yerkes

National Primate Research Center, is interested in developing novel magnetic resonance technologies to study anatomy, physiology and function non-invasively at the systems level, and then applying these technologies to address topics in neuroscience (mapping columnar and laminar structures), neurological (stroke) and neurodegenerative diseases in the brain and the retina. Duong works with the CBN Imaging Core.



WILLIAM FANTEGROSSI, PhD, research associate in the Division of Neuroscience at the Yerkes National Primate Research Center, studies

the behavioral pharmacology of serotonergic drugs of abuse, specifically, MDMA (ecstasy) and the hallucinogens in rodents and nonhuman primates. He is interested in the discriminative stimulus and reinforcing effects of these compounds, particularly as pertains to the modulation of these endpoints by 5-HT1A and 5-HT2A receptors, as well as the role of endogenous serotonin in the mediation of these effects. Fantegrossi is a member of the Reward and Reinforcement Collaboratory.

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IN APPRECIATION...

The CBN would like to express its appreciation to Paul Lennard for his service as Co-Director for Education and wish him the best in his future endeavors.

Research May Explain Why Males and Females Experience Pain Differently

A study conducted by CBN faculty, Anne Murphy, and CBN graduate scholar, Dayna Loyd, both at Georgia State University (GSU), reports that anatomical and functional differences in the brain may explain gender differences in the experience of pain and the effects of certain drugs on pain.

The finding reported in the *Journal of Comparative Neurology*, is the first report of specific differences in the parts of the brain responsible for the transmission of pain sensations in the body. Along with a host of clinical evidence, this finding could lead to the development of differential treatments for pain in men versus women.

Pain has been described as the modern epidemic. More than 70 percent of adults will experience chronic pain at some time in their lives. Thus, the management of pain has become one of the highest priorities in health care. Chronic pain from inflammatory conditions such as arthritis and fibromyalgia are the most prevalent and pervasive forms of chronic pain.

Clinical evidence suggests that women are much more likely to experience chronic forms of pain than are men and that women report feeling more pain than men following various medical procedures.

Recent recommendations from the American Academy of Pain Medicine and the American Pain Society indi-

cate that opioid drugs or “narcotics,” such as morphine, are essential in the management of chronic pain. However, there is well-established clinical and nonclinical evidence that males and females do not respond the same to the effects of morphine. Specifically, females tend to request higher doses of morphine than males for pain relief following various medical procedures.

This study by Murphy and Loyd showed that male and female rodents are anatomically different in the area of the brain called the periaqueductal gray (PAG) and its projection to the spine, called the PAG-RVM (rostral ventral medulla) circuit, believed to be the main pain circuit in the brain-body experience of inflammatory pain and its treatment by opioid drugs. Specifically, females showed more PAG-RVM neurons than males.

The study also showed that the PAG-RVM circuit was significantly more activated by inflammatory pain in males than in females and that the opioid drug, morphine, reduced the response of this circuit to inflammatory pain to a greater degree in males versus females.

These results provide the first potential anatomical and functional explanation for gender differences in the experience of pain and responses to the drug morphine in the treatment of pain.



Photo Courtesy of Anne Murphy

Anne Murphy's research is the first to provide potential anatomical and functional explanation for sex differences in the experience of pain and responses to the drug morphine in the treatment of pain in males and females.

Given that morphine is currently the drug of choice for treating several types of post-operative pain, these results provide important details about how morphine might be used differently in females and males to achieve maximum pain relief. ■

BRAIN BALLOON



Be on the lookout for more information on a nine-story hot air balloon in the shape of a human brain! Our local neuroscience organizations are partnering with the National Autism Tissue Program and the Dana Alliance to sponsor balloon inflation and hands-on neuroscience teaching modules at its base. Specific time and location to be determined. Contact Kyle Frantz (kfrantz@gsu.edu) for more information.

Stress-Induced Obesity

Continued from page 1

pairings, only the losers (defeated hamsters) and not the winners (dominant hamsters) show these changes.

Bartness and Huhman hope that this model can be exploited in the future to uncover the brain mechanisms underlying this whole process. With such knowledge, it might be possible to generate pharmacological approaches to attack stress-induced

obesity in humans and block or reverse it.

Bartness credits the success of this research to graduate student interactions fostered by the CBN.

“What really got this research going was the friendship between Matia Solomon in Dr. Huhman’s lab and Michelle Foster in my lab. They are the energy behind getting this

research off the ground and did all the work. It would have never happened if it wasn’t for the CBN, that is for sure.” ■

* “Social Defeat Increases Food Intake, Body Mass, and Adiposity in Syrian Hamsters,” was one of the most-frequently read articles in the May issue of the *American Journal of Physiology*.

CBN Summer Programs: 2006 Highlights

Brain Camp for Kids: Neuroscience in Action!

Brain Camp is a summer education program for upper elementary and middle school students interested in science. It gives them the chance to learn about the brain through fun, hands-on activities led by real neuroscientists. The curriculum, which is tied to the new Georgia Performance Standards for seventh-grade life science, consists of a series of activities such as: dissection of sheep's brains and cow eyes, experiments on the sensory system, and building "beady" neurons.

More than 20 rising fourth-through-eighth grade students attended this year's camp, which took place July 24-28 at Renfroe Middle School.

"All of the students who attended Brain Camp were self-selected for their interest in science," said CBN Educator and Brain Camp Director Laura Carruth, PhD. "Each morning they arrived at camp eager to learn."

The week culminated with an "open house" where parents and friends of the students were taught, by the students themselves, some of the things they learned during the week.



Above: Learning to dissect sheep's brain is only one of the many hands-on Brain Camp activities.



Left: Taste this! Kids have fun learning about their senses.

Teacher Workshop

In its fourth year, the Animal Behavior and the Brain Teacher Workshop is a hands-on program that explores the fascinating and complex world of animal behavior at Zoo Atlanta. This summer, 18 metro-Atlanta teachers learned how to effectively teach neuroscience in their classrooms through the workshop, which took place the week of June 5-9.

Created by the CBN's partnership with Zoo Atlanta, the weeklong event focuses on helping teachers to identify animal behavior and learn about the hormonal and neuronal mechanisms that control them. Also, through behind-the-scenes tours from zoo staff, participants observe animals and learn about their behaviors. The workshop was developed by CBN Science Educator Laura Carruth, PhD.

"During the workshop, we expose teachers to a higher level of educational content, which gives them the experience needed to teach brains and behavior in their classrooms," Carruth said.

"It was the best workshop I have ever attended in the 15 years of my teaching career."

-- Teacher Workshop Participant



Above and Left: Teacher Workshop participants are treated to behind-the-scenes tours from Zoo Atlanta staff.



Beginning at the elementary school level, the CBN's education programs open students' minds to the wonders of the brain through innovative classroom activities and programs, including brain camps and hands-on research training. CBN educators also lead professional development workshops for metro-Atlanta teachers on the latest research methods and tools for teaching neuroscience effectively.

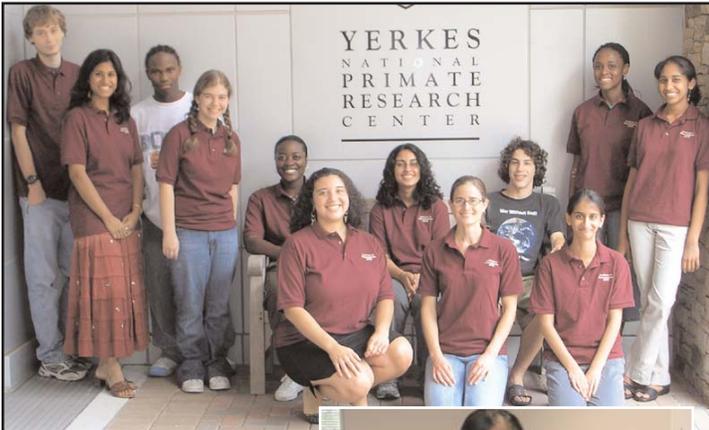


Institute on Neuroscience

ION (Institute on Neuroscience) is an eight-week summer program, sponsored by the CBN, the Science National Honor Society, and Emory's Science Society Program, for rising high school seniors who excel in science.

The Institute, which took place June 12 – Aug. 4, gave 10 young scholars the opportunity to participate in research laboratories where they learned about various research techniques, such as *in situ* hybridization, hormone assays, and behavior analysis. Scholars also learned about neuroscience through hands-on activities, discussions and readings directed by faculty members, post-doctoral researchers, and undergraduate and graduate students from CBN member institutions. Special workshops focused on primary literature, scientific communication, science and society, and ethics in science, among other topics.

"This year's scholars were once again extra ordinary in their high level of motivation and dedication to science," said CBN Educator and ION Director Kyle Frantz, PhD.



Above: ION 2006 participants.

Right: ION students participate in real neuroscience research.

Photos Courtesy of Renee Hayslett



Behavioral Research Advancements in Neuroscience

BRAIN (Behavioral Research Advancements in Neuroscience) is a comprehensive neuroscience education program geared mostly toward minority and female undergraduate students who are interested in pursuing careers in science. The program is designed to spark students' interest in behavioral neuroscience and encourage the pursuit of graduate studies in the field. More than 20 students participated in this year's program, which took place June 5 – Aug. 11.

"This program provides students with an opportunity to conduct scientific research within some very prominent departments in the scientific and academic communities," said BRAIN mentor Heather Kimmel, PhD, Assistant Professor in the Department of Pharmacology at the Emory University School of Medicine. "The students get a chance to see what working in a lab is really like and to communicate with people at different stages of their scientific careers."



Above: BRAIN students present their research posters during the BRAIN closing ceremony.

Right: Making life-long friends is just an added bonus of the BRAIN program.



For more information on the CBN's educational programs, visit: www.cbn-atl.org/education

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CBN Spring Symposium A Success

The sixth annual CBN Spring Symposium took place on Saturday, May 20, 2006 at the Whitehead Research Building on Emory's campus.

The Symposium, organized by CBN researchers Kyle Frantz, PhD, and Darryl Neill, PhD, was entitled: "Neural Mechanisms of Reward and Reinforcement." The program brought out almost 200 faculty and students from several metro-Atlanta colleges and universities, and also guests from North Carolina State's Keck Institute

and the University of Indiana's Evolutionary Biology Program.

"This year's symposium stands out for two reasons: first, the audience represented a diverse group of neuroscientists. Second, the organizing committee students did a particularly good job introducing and hosting the speakers. All of the speakers commented to me and Darryl about how impressed they were with the students' knowledge and preparation," Frantz said. ■



Nearly 200 faculty and students packed the Emory University Whitehead Research Auditorium on May 20, 2006 for the CBN's Spring Symposium "Neural Mechanisms of Reward and Reinforcement."

SFN Satellite Symposium - Oct. 12

SYMPOSIUM ON ADVANCES IN DRUG ABUSE RESEARCH *MOLECULAR AND BEHAVIORAL BASIS OF ADDICTION*

Location: Bourne Seminar Room
Emory University Campus
Yerkes Primate Center Conference Room
954 Gatewood Road, NE
Atlanta, GA

Date: Oct. 12, 2006

Time: 1:00 p.m. - 5:00 p.m

Parking: FREE in Yerkes' visitor parking

Sponsors: International Drug Abuse Research Society (IDARS)
The Yerkes National Primate Research Center
(Emory University)
The Center for Behavioral Neuroscience (CBN)

Speakers: Eric Nestler, USA
Pier Piazza, France
Francesco Fornai, Italy
Heather Kimmel, USA
David Weinshenker, USA

Registration: Mike Kuhar (mkuhar@emory.edu) *or*
Susan Marshall (susan.marshall@emory.edu)

An official satellite of the Society for Neuroscience Conference.

New Venture Grants

Reproduction/Fear

"Limbic CRH over-expression inhibits the reproductive axis."

Pls: Erin Keene-Rhinehart, Mark Wilson, Kerry Ressler, Hemu Nair, Donna Toufexis

Agression/Molecular Core

"Gene expression changes following agonistic encounters in Syrian hamsters."

Pls: Chris Markham, Kim Huhman, Byron Ford and Elliott Albers.

Sex Differences/Cognition and Memory/Behavioral Technology Core

"A computerized testing system to investigate sex differences in rhesus monkey visual cognition."

Pls: Julie Martin-Malivel, Jocelyne Bachevalier and Kim Wallen

Reproduction/Sex Differences

"Sexually dimorphic regulation of the nucleus paragigantocellularis: Potential role in reproductive behavior."

Pls: Anne Murphy and Andrew Clancy

Fear/Reward and Reinforcement

"Disentangling pathways for reward and fear in the amygdala."

Pls: Darryl Neill and Mike Davis

Fear/ITI Core

"Multi-electrode approaches to probing affective circuits in awake, behaving animals."

Pls: Don Rainnie, Helen Mayberg and Steve Potter

Affiliation/Sex Differences

"Delineation of oxytocin circuits that regulate affiliative behaviors."

Pls: Larry Young and Anne Murphy

CBN Names New Graduate Committee Chair

Dr. Don Rainnie of Emory University

Don Rainnie, PhD, a professor at Emory University, was recently named the new CBN Graduate Committee Chair.

The CBN currently has more than 50 graduate student members and scholars. The graduate committee works to develop and maintain a sense of community among these students across institutions in order to provide them with access to broader educational options and to a larger community of experts in the field of behavioral neuroscience. This committee is currently working to provide funding for CBN graduate students beyond 2009 when funding from the NSF will end. ■



Rainnie

Continued from page 2



KETEMA PAUL, PhD, assistant professor in the Department of Anatomy and Neurobiology at Morehouse School of Medicine, studies the genes, molecules, and hormones that influence sleep and wakefulness. He is interested in how the hypothalamic nuclei that regulate sleep, promote and respond to the deleterious effects of extended wakefulness and stress in mice; and he measures the effects of sleep and wake promoting agents on gene regulation in the hypothalamic sleep centers. Of particular interest are the effects of age and gender on the responses of sleep to environmental challenge. The goal is to identify the hypothalamic factors that drive sleep and wakefulness and detail the impact of age and gender on hypothalamic sleep regulation.



JAMES THOMAS, PhD, assistant professor in the Department of Human Genetics at Emory University, uses genomic technologies and resources to gain novel insights into the functional information encoded within the human genome. Comparative genomics provides a powerful means by which functional elements can be detected in the human genome. His lab is pursuing computational and experimental paradigms toward the functional characterization of vertebrate genes and genomes. In particular, they identify, characterize and experimentally assay "evolutionary alleles" as a means to dissect genomic sequence function.



DANIEL OLAZABAL, PhD, research associate in the Department of Psychiatry and Behavioral Sciences at Emory University, studies the neurobiology of variability in parental care and caring activities. He is interested in understanding how the brain processes pup related stimuli, and what makes different individuals or species respond differently to these stimuli. He investigates how these differences develop, and how caring activities are influenced by emotions, and different biological contexts. To reach these goals, Olazabal does neurobiological, psychobiological, developmental, neurochemical, hormonal and genetic studies. He is a member of the Affiliation, Cognition and Memory, and Fear Collaboratories.

SAVE THE DATE: OCT. 13, 2006

Satellite Symposium of the SFN Annual Meeting

Oxytocin, Vasopressin and Emotional Regulation: New Frontiers in Basic Neuroscience and Translational Opportunities



- Organizers:** Larry J. Young (Emory) & Colin D. Ingram (Newcastle)
- Location:** Loudermilk Center, 40 Courtland St., Atlanta, GA (parking on premises)
- Registration:** Participation is FREE, but registration is REQUIRED. To register, please email Kelly Powell at kpowell@gsu.edu.

SYMPOSIA

Affiliation and Social Bonding

Larry Young (Emory Univ.), Sue Carter (Univ. of Illinois), Marcus Heinrichs (Univ. of Zurich)

Parental Behavior

Cort Pedersen & Maria Boccia (Univ. N. Carolina), Daniel Olazabal (Emory Univ.)

Anxiety and Emotionality

Colin Ingram (Univ. of Newcastle), Inga Neumann (Univ. of Regensburg), Rick Thompson (Bowdoin College)

Translational Opportunities

Robert Ring (Wyeth), Eric Hollander (Mount Siani, NY), Richard Ebstein (Jerusalem, Israel)

PANEL DISCUSSIONS

How Can We Do Pharmacological Studies in Humans?

Discussants: Caroline Cohen, Maurice Manning, Marcus Heinrichs and Cort Pedersen

In Vivo Imaging of Receptors in the Brain.

Discussants: Mark Goodman, Andreas Meyer-Lindenberg and Craig Ferris

www.cbn-atl.org/news/newfrontiers2006.html

**STOP BY THE CBN BOOTH
AT THE SFN MEETING!**

BOOTH # 2742