

What's inside

RESEARCH 2

Innovative Neuroscience Discoveries

EDUCATION 4

CBN Programs Reach Thousands

IN OUR FUTURE 6

Science of Positive Emotions

NEWS 8

Members Receive SFN Award



"The CBN has been a catalyst in establishing the Atlanta area as a premier site for behavioral neuroscience research."

- National Science Foundation



Synapse

FALL 2009

A quarterly publication of the **CENTER FOR BEHAVIORAL NEUROSCIENCE**

Celebrating 10 Years of the Center for Behavioral Neuroscience

Proud of our past - excited about our future

This year, the Center for Behavioral Neuroscience is celebrating its 10th anniversary as a National Science Foundation Science and Technology Center. In this edition of the *Synapse* newsletter, we pause to look back on our accomplishments.

We hope that you enjoy the photographic glimpses of our history and relive with us the moments we announced our first graduate scholars, introduced our first postdocs, welcomed our first BRAIN undergraduate research fellows and more.

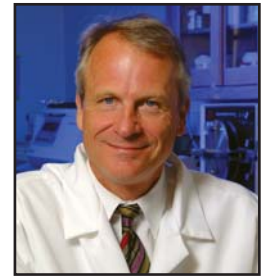
As we fondly look back, we are also busy on future endeavors that hold fast to the Center's tradition of building multi-disciplinary collaborations leading to innovative discoveries in the neurosciences. One notable project is our work in the field of positive emotions.

Thanks to support from a Templeton Foundation planning grant, we are developing new research ideas to investigate the fundamental neuroscience of positive emotions and social traits such as social bonding, tolerance, trust, altruism, cooperation, empathy and hope. We've already created a new collaborative group that is developing research proposals in these areas to be submitted for funding next year.

Our ultimate goal is to understand the neurobiological bases of these "prosocial" behaviors and how these behaviors have developed over time in both non-humans and humans. See page 6 for more details.

While the exact date and time have yet to be set, we invite you to attend a spring 2010 symposium on this very topic. Plans are to bring together, with our own investigators, international speakers who can share their expertise and help us to further develop this burgeoning field of research. We will be posting symposium information and updates on the CBN Web site (www.cbn-atl.org) and in our upcoming *Synapse* newsletters.

Start making your plans now to become part of the Center's next 10 years.



CBN Director
H. Elliott Albers, Ph.D.



See inside for more glimpses of CBN history.

Thomas Insel, MD, first director of the Center for Behavioral Neuroscience. Dr. Insel is now director of the National Institutes of Mental Health (NIMH).

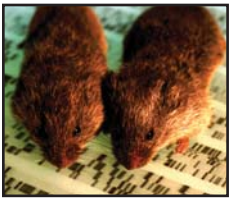
CBN Funding Sparks Innovative Neuroscience Discoveries

During its 10-year history, the Center for Behavioral Neuroscience has made tremendous contributions to the field through innovative research. Grants seeded through CBN support have helped the Center's researchers

garner more than \$114 million in external funding. Today, CBN scientists continue to make fundamental discoveries in areas as diverse as the molecular mechanisms of social bonding, the neural systems responsible for stress and emotional

learning, and the cognitive processes underlying complex decisions and social behavior. Below are just a few examples of CBN members' innovative research.

Working to Understand Social Bonds and Attachment Disorders



Larry Young, Ph.D., Emory University

In 2001, Larry Young, Ph.D., CBN member at Emory University's School of Medicine, and his colleagues, enhanced pair-bonding in monogamous male prairie voles by transferring a receptor gene for the neuropeptide arginine vasopressin (AVP) into the brain. A few years later, Dr. Young and colleagues completely changed the pair-bonding behavior of the promiscuous meadow vole to monogamous by transferring the same receptor gene into the brain's reward center. These were some of the first studies to demonstrate that viral vector gene transfer can change complex social behaviors such as social attachment. Dr. Young and his collaborators have continued to uncover the importance of hormones such as vasopressin and oxytocin in the formation of social bonds, in the processing of social information, and in disorders of the ability to form social attachments such as with autism and schizophrenia.

More Effective Pain Relief for Women and Infants



Anne Murphy, Ph.D., GSU

Research in the laboratory of Anne Murphy, Ph.D., CBN member at Georgia State University, has led to breakthroughs in the understanding of pain that could put clinicians one step closer to more effective pain treatment for women and infants. It is widely known that analgesic drugs like morphine are typically less effective in females than in males. Dr. Murphy and former CBN graduate scholar, Dayna Loyd, Ph.D., showed that critical sex differences in mu-opioid receptor expression in the periaqueductal gray (PAG) area of the brain is the most likely explanation for this difference. A more recent study by Dr. Murphy and former CBN graduate scholar, Jamie LaPrairie, Ph.D., showed that infant rodents exposed to pain without adequate analgesia showed a decrease in sensitivity to morphine in adulthood, suggesting that human infants undergoing painful procedures without adequate pain treatment, may require more medication in adulthood to moderate pain. This information is important to the clinical treatment of pain in women and infants.

Hamsters May Hold Answer to Battling Human Obesity



Investigations by CBN researchers Tim Bartness, Ph.D., and Kim Huhman, Ph.D., of Georgia State University, along with CBN graduate scholars Michelle Foster and Matia Solomon, have shown that Syrian hamsters may hold vital clues to understanding unhealthy food cravings and obesity. These studies found that these hamsters increase body and fat mass under social stress, and most weight is gained in the abdominal area, making the species an ideal model to study human stress-induced obesity. More recently, Dr. Bartness, C. Kay Song, Ph.D. of GSU, along with Gary J. Schwartz, Ph.D., of the Albert Einstein College of Medicine, found that fat cells use sensory nerves to provide feedback to the brain to regulate fat burning. Using viruses to trace communication among the hamsters' sensory nerves, they found the brain, in turn, communicates back to the cells to initiate, continue or stop fat burning depending upon the information the brain receives from fat cells. These findings will ultimately help scientists better understand normal and abnormal weight regulation.

Looking back



Former First Lady Barbara Bush and her husband were on hand for the installation of CBN member Dr. Peter MacLeish as the George H.W. Bush and Barbara P. Bush Chair of Neuroscience at Morehouse School of Medicine on Feb. 5, 2001.



In 2005, CBN member Tim Bartness, Ph.D., Georgia State University, spoke at the 134th Alfred Nobel Symposium, sponsored by The Nobel Foundation that awards The Nobel Prize.

Developing New Treatments for Fear-Related Disorders



Virtually Better

Some basic research with rats has led CBN members to develop new clinical treatments

and tools that may help people overcome a variety of fear-related disorders. Michael Davis, Ph.D., and Kerry Ressler, MD, Ph.D., of Emory University's School of Medicine, initially found that the drug D-cycloserine (DCS) can successfully suppress a conditioned fear response in rats. Drs. Davis and Ressler then joined forces with Barbara Rothbaum, Ph.D., also of Emory, combining DCS with virtual reality technology to treat patients suffering from phobias. For example, for someone with an excessive fear of heights, Dr. Rothbaum has simulated a self-controlled glass elevator going up the outside of a 50-story building. Virtual reality provided a well-controlled psychotherapeutic situation to confirm that DCS enhances the treatment process in many patients. Other clinical research being conducted by CBN investigators on PTSD in war veterans has also benefitted from the information learned in these earlier studies, resulting in new treatment tools for PTSD.

Community Partnership with Zoo Atlanta Benefits Both Zoo Researchers and its Animal Residents



Zoo Atlanta

The Center's partnership with Zoo Atlanta has led to new cognitive research on great apes, opening of the Orangutan Learning Tree Exhibit, and aided in the birth of the giant panda cub, Mei Lan.

The Center worked with the Zoo to create an interactive training panel that allows zookeepers to train gorillas on simple tasks such as opening their mouths for inspections or presenting their arms for injections. CBN member and Zoo scientist, Tara Stoinski, Ph.D., also uses the panel to conduct studies on tool-use in the gorillas.

The CBN was proud to be part of a historic event that took place with the birth of the Zoo's first giant panda cub, Mei Lan, the first offspring of Lun Lun and Yang Yang. The Center began working with the Curator of Giant Panda Research and Management, Rebecca Snyder Ph.D., in late 2003 to help determine Lun Lun's peak ovulation. Because the peak mating period is a short window of three or four days in the spring, it was critical to predict accurately and quickly the receptivity of the female for mating. Elliott Albers, Ph.D., and

colleagues from Georgia State University were able to conduct the assays in their lab, just minutes away, and provide results in a matter of hours. Dr. Snyder used the results to determine the optimum "window" for conception. These results were displayed to the public outside the panda exhibit.

The Orangutan Learning Tree officially opened in April 2007. The tree houses a large touch-screen computer built to be flush with the tree's outer surface. The orangutans perform cognitive tasks on the computer screen where visitors can watch. Visitors have a similar computer in the viewing area where they can compare their own cognitive abilities with the orangutans. This exhibit, made possible with funding from the CBN, IBM and an anonymous donor, is allowing Zoo Atlanta scientists to learn more about the orangutan's cognitive processes.

CBN members continue their research collaborations with Zoo scientists as they work to preserve and protect these species and educate the public on the importance of conducting research to understand their behavior.

Other CBN research stories can be found in the *Synapse* archives: www.cbn-atl.org/news/synapse.shtml.

"A model for conducting nationally recognized scientific research through a broad consortium of colleges and universities."

- GeorgiaBio on the CBN



CBN Director Elliott Albers, Ph.D., receives the 2006 Biomedical Community Award, on behalf of the CBN, from Georgia Biomedical Partnership (now GeorgiaBio) President Charles Craig.



CBN Director Elliott Albers, Ph.D., accepts the 2009 Georgia State University Exceptional Service Award for his work with the Center. Pictured from left: GSU President Mark Becker, Dr. Albers and former GSU Provost Ron Henry. Photo by: GSU

Education Programs' Impact

By the Numbers

Since its inception, the CBN has shared neuroscience education with thousands of students from kindergarten thru the postdoctoral level.

27,000

K-12 students introduced to neuroscience via the annual Brain Awareness Month classroom visits coordinated with the Atlanta Chapter of the Society for Neuroscience.

1,240

Middle school students have taken part in Brain Camp for Kids and/or the Neuroscience Exposition Reverse Science Fair.

556

Students conducted summer research in a neuroscience lab as part of the Behavioral Research Advancements In Neuroscience (BRAIN) program for undergraduates or the Institute On Neuroscience (ION) program for high schoolers.

246

High school students who have competed in the Georgia Regional Brain Bee.

204

Georgia K-12 science teachers have taken part in the Animal Behavior and the Brain Teacher Workshop at Zoo Atlanta.

104

Students have been accepted into the Center's Postdoctoral Fellow or Graduate Scholar programs.

Where Are They Now?

Postdoctoral Fellow Now Award-Winning Scientist

In June 2000, shortly after becoming an NSF 10-year Science and Technology Center, the Center for Behavioral Neuroscience awarded its first three postdoctoral fellowships. From this group, Lisa Parr, Ph.D., has remained with the CBN and Emory University to become an award-winning scientist.

After graduating from Emory University's Psychobiology Graduate Program, where she worked with Dr. Frans de Waal on a series of studies on face recognition and emotional processing in chimpanzees, Dr. Parr began her CBN postdoctoral fellowship under the guidance of Emory scientists Drs. Jim Winslow and Mike Davis. During the fellowship, she extended her studies of emotional processing to rhesus monkeys.

Today, she is an assistant professor in the Division of Psychiatry and Behavioral Sciences at Yerkes National Primate Research Center, Emory University. She has received awards and honors from such renowned groups as the National Institutes of Health, the HealthEmotions Research Institute at

the University of Wisconsin and the American Psychological Association, to name a few.

Her lab is involved in a number of different experimental studies to understand the behavioral, cognitive and neural bases for social cognition in non-human primates, with particular interest in the way chimpanzees

and rhesus monkeys recognize faces and facial expressions.

In a study published in *Current Biology*, Dr. Parr and her colleagues were the first to examine brain activity in chimpanzees after they attempted to match fellow chimps' faces. As a result, they were able to confirm both humans and chimps, for the most part, use similar brain regions to register faces.

She has traveled around the world presenting her research, and received international media attention with recent pieces on BBC Radio and PBS Kids television on-line. Her research will be featured on "The Human Spark," a three-part television series hosted by Alan Alda and set to broadcast on PBS in January 2010. Broadcast information can be found on-line:

www.pbs.org/wnet/humanspark/



Lisa Parr, Ph.D., Yerkes National Primate Research Center, Emory University. Photo courtesy: Lisa Parr

Looking back



Winners of the first Atlanta Brain Bee on Feb. 21, 2001. From left: Ezral Jackson (10th grade, Booker T. Washington High School, 3rd place); Nyamezela Thandiwe (11th grade, Mays High School, 2nd place); and Brittany Dukes (9th grade, Stephenson High School, 1st place).



The first CBN Scholars class. Flanked by CBN Director Tom Insel (left), top row, from left: Miranda Lim, Silke von Esenwein, Matia Banks, Michelle Foster and Aaron Jasnow. Bottom row, from left: Heather Caldwell, Elizabeth Hammock and Alicia Faruzzi.

What They're Saying...



Brain Expo Reverse Science Fair
 "This is the 'piece de resistance' for our school as we only have one major field trip during the year. So many of our students look forward to it."

Michaelangelo Calhoun,
 Teacher, Renfroe Middle School,
 Decatur, Georgia



Brain Camp for Kids
 "EVERYTHING!"

Student's reply when asked about the best part of camp.



BRAIN (Behavioral Research Advancements In Neuroscience)

"It's really amazing to be an apprentice. Though I've designed an experiment in class, I haven't actually worked in a lab before, like I'm doing now."

BRAIN Fellow

Where Are They Now? Graduate Scholar Now a Postdoctoral Student and Neuroscience Mentor

Matia Banks Solomon, Ph.D., earned her undergraduate psychology degree in 1999 from Georgia State University and went on to become one of the CBN's first graduate scholars. Today, she is working on her postdoc in the lab of James Herman at the University of Cincinnati and fulfilling her goal of mentoring others in neuroscience.

"I have worked for the last two years as a mentor to a Latin-American female undergraduate student. She is applying to MD/Ph.D. programs so that she can continue to do neuroscience research," Dr. Solomon said.

"Watching someone grow from being fully dependent on you to now having fruitful debates about the best way to design an experiment is the most exhilarating feeling."

While with the CBN, she worked in the lab of Georgia State University Professor Kim Huhman, Ph.D., to study sex differences in the behavioral and hormonal responses to social defeat in Syrian hamsters. She says it was this experience that cemented her passion for the study of sex differences and stress. As a postdoc in Dr. Herman's lab, Dr. Solomon's work focuses on sex differences in limbic system

regulation of the neuroendocrine and behavioral responses to chronic stress, where she says she hopes her work will be a significant contribution to the field with regards to sex differences in psychopathology.

Dr. Solomon is the recipient of awards from the Organization for the Study of Sex Differences, and from the National Institutes for Diabetes

and Digestive and Kidney Diseases. She has also published several papers which have appeared in such noted publications as the *Journal of Neuroendocrinology and Hormones and Behavior*.

She says that upon completing her postdoc

training she would like to become a faculty member at a major research institution.

"I hope to have a thriving research program geared towards investigating the behavioral, neuroendocrine and metabolic consequences of chronic stress in females and males," she said. "When I think about how far I have come since first entering Dr. Huhman's laboratory, it truly strengthens my desire to be a leader in my community and educate people about the importance of what we do as neuroscientists."



Matia Solomon, Ph.D., Post-doc, University of Cincinnati. Photo courtesy: Matia Solomon.

Georgia State University



On March 24, 2001, the Center hosted a CBN Family Night at SciTrek in conjunction with the first Atlanta Brain Awareness Fair (Brain Expo). Pictured: Jeff Kitzler, husband of CBN member Kim Gernert.



Governor Sonny Perdue signs a proclamation officially declaring March 2007 "Brain Awareness Month" in Georgia. From left: Kerry Ressler and Rebecca Rosen of Emory University, CBN Director Elliott Albers of Georgia State University, Governor Perdue, and Kyle Frantz, Anne Murphy, Laura Carruth and Michael Black of Georgia State University. Not pictured: Kim Maguschak. Photo courtesy of Governor Sonny Perdue's Office.

New Research Group to Focus on “Positive” Human Behaviors

Surprise box office hit “The Blind Side” depicts the true story of Michael Oher, a homeless African-American youngster from a broken home that is taken in by the Touhy family for no other reason than to help him reach his full potential. Today, Oher is a pro football player for the NFL's Baltimore Ravens.

It is this type of altruistic behavior, shown by the Tuohy family, that is the topic of a new research endeavor at the Center for Behavioral Neuroscience.

With support from a Templeton Foundation planning grant, several members of the CBN are developing research ideas to investigate the fundamental neuroscience of positive emotions and social traits such as social bonding, tolerance, trust, altruism, cooperation, empathy and hope.

“While the study of positive emotions has now become a vibrant component of several areas of social science, far less work has been done on the fundamental neural processes related to positive emotional and social states,” said CBN Director, Elliott Albers, Ph.D. “The CBN wishes to build complementary work in neuroscience in this area by stimulating new advances in basic neuroscience research focused on social bonding.”

The study of positive emotions has been defined as a fairly new

branch of psychology that “studies the strengths and virtues that enable individuals and communities to thrive.” These strengths and virtues have been labeled with terms such as prosocial behavior, altruism and social bonding. Prosocial behavior has been defined as “caring about the welfare and rights of others, feeling concern and empathy for others, and acting in ways that benefit others,” such as how Leigh Anne Tuohy helped Oher in the movie.

The overarching question addressed in the research is how prosocial behaviors came to exist in a world where individuals compete for the essentials to live and survive. The ultimate goal of the Center's research program is to understand the neural bases of prosocial behaviors and how such behaviors arose in the human species.

To reach their goal, CBN collaborators will conduct in-depth research on the hypothesis that neural mechanisms promoting the mother-infant bond, which is well-developed in the mammalian species, is the foundation for the evolution of social processes including empathy, cooperation and social bonding.

CBN scientists from this group also propose that many of the processes underlying empathy in humans are manifest in parental behaviors, therefore suggesting the degree to which appropriate parental behaviors are observed in an



CBN collaborators meet to discuss new research ideas to investigate the fundamental neuroscience of positive emotions. This new collaboration is supported by a Templeton Foundation planning grant.

individual may correlate with the degree of empathetic response.

The research will focus on five basic neurobiological areas or systems to evaluate these hypotheses, including cognition, emotion, neuroendocrine, neurophysiology and neural structure, and connectivity.

“The specific projects will investigate one or more of these factors in a comparative context making it possible to evaluate the extent to which species vary in these areas and how these areas interact to determine prosociality of different species, and how similar endpoints may be achieved through the interactions of different mechanisms.” Dr. Albers said.

The CBN will host a symposium in the spring of 2010 on this topic. Updates, including date and location, will appear in upcoming issues of the *Synapse* newsletter and on-line at: www.cbn-atl.org

Receive E-mails and Updates About the Positive Emotions Group

Join the Positive Emotions' listserv to receive meeting information. The group typically meets every other month. To join, e-mail:

Veronica Williamson
Neuroscience Institute
Georgia State University
E-mail: williamsonv@gsu.edu



To find out more about how you can become involved with the Positive Emotions team, contact:

Elliott Albers, Ph.D.
CBN Director
E-mail: biohea@gsu.edu

Kelly Stout, Ph.D.
CBN Associate Director
E-mail: kpowellstout@gsu.edu

GSU to Offer Master's and Doctorate Degrees in Neuroscience

The Board of Regents of the University System of Georgia has granted approval to Georgia State University to offer Doctor of Philosophy and Master of Science degrees in neuroscience.

"Through a rigorous academic curriculum and an emphasis on cutting-edge research, those graduating from Georgia State's new Ph.D. program will add to the greater body of knowledge that will ultimately bring forth new treatments and interventions to neurological diseases and disorders that affect millions across the globe," said Senior Vice President for Academic Affairs and Provost Risa Palm.

"Georgia State has long been a national and international center for neuroscience research," said Dean Lauren Adamson of the College of Arts and Sciences. "The creation of a Ph.D. program in neuroscience will let us take a leading role in educating the next generation of researchers."

The program begins during the fall semester of 2010. Applications will be accepted starting in mid-November, and the deadline for applications is Jan. 5, 2010. Officials are developing a curriculum of core courses to be added alongside GSU's existing courses in fields such as biology and psychology. Students in the Ph.D. track will earn the M.S. degree as they complete the doctoral

program. About 14 students per year are expected to graduate from the program.

Neuroscience graduate students at GSU can become active members of the CBN. The CBN also affords opportunities for graduate students to participate in neuroscience education efforts that range from elementary school through the graduate level.

For more information visit: neuroscience.gsu.edu/3622.html



Jeremy Craig
Georgia State University

Help Support Our Education Programs

Donors like you will play an important part in helping the Center for Behavioral Neuroscience continue to provide science education programs to students and teachers.

To find out how you can help:

Kelly Stout, Ph.D.
Associate Director
Center for Behavioral Neuroscience
E-mail: kpowellstout@gsu.edu
Phone: 404.413.5475

For a complete listing of CBN education programs:

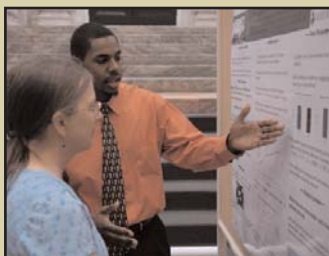
www.cbn-atl.org/education/index.shtml



Brain Camp for Kids:
A one-week summer camp for middle school students.



Institute On Neuroscience (ION): An eight-week summer research program for high school students.



Behavioral Research Advancements In Neuroscience (BRAIN):
A 10-week summer research program for undergraduate students.



Teacher Workshop: A five-day summer neuroscience workshop for Georgia's K-12 science teachers.

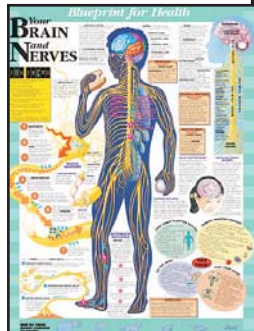
Lending Library Changes Hands

The Atlanta Chapter of the Society for Neuroscience is now managing the Center for Behavioral Neuroscience Lending Library,

which is funded in part by generous donations from the DANA Alliance.

Housed at Georgia State University, the collection of 46 different tissue specimens, brain models, posters and more are available for use in K-12, undergraduate and graduate classrooms, as well as for special events, lectures or workshops. Educators can “check-out” any of these materials as one would check out a library book.

Reservations must be made two weeks in advance by contacting Veronica Williamson via e-mail: williamsonv@gsu.edu or by visiting: www.cbn-atl.org/education/library.shtml



The Lending Library is home to more than 46 different items such as posters and plastic models that can be checked-out as one checks out a library book.

CBN Members Receive SFN Next Generation Award



Kim Maguschak and Michael Black, Ph.D., receiving the SFN Next Generation Award from Society President Thomas Carew, during the annual meeting in Chicago, Nov. 17-21, 2009. Courtesy of the Society for Neuroscience (www.sfn.org). All rights reserved. Photography by Joe Shymanski and Jeff Nyveen.

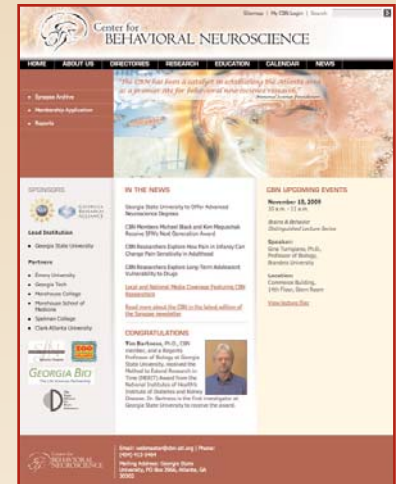
CBN members Michael Black, Ph.D., and Kim Maguschak, recently received the Next Generation Award during the Society for Neuroscience Annual meeting in Chicago.

The award, which is given to individuals at the pre/postdoctoral and junior faculty level, recognizes those who have made outstanding contributions to public communication, outreach and education about neuroscience.

Dr. Black, who works in Dr. Walt Wilczynski's lab at Georgia State University, and Kim Maguschak, a graduate student who works in the lab of Kerry Ressler, Ph.D., at Emory University, have both served as coordinators for the Atlanta Chapter of the Society for Neuroscience Brain Awareness Month outreach visits since 2006 and have helped to bring neuroscience education to more than 27,000 students in K-12 classrooms. Their efforts in organizing outreach events have brought together volunteers from local colleges and universities to provide personalized programs for Atlanta-area schools. The two were also successful in their efforts to have Governor Sonny Perdue declare March as Brain Awareness Month in Georgia.

CBN member Laura Carruth, Ph.D., Assistant Professor of Neuroscience at Georgia State, received Honorable Mention for her work directing the CBN's Brain Camp for Kids: Neuroscience In Action summer camp for middle school students, and the Animal Behavior and the Brain Teacher Professional Workshop at Zoo Atlanta for Georgia's science teachers.

Kyle Frantz, Ph.D., Georgia State Associate Professor of Neuroscience and CBN member, is the 2007 recipient of the Next Generation Award.



Keep Checking the CBN Web Site for Updates

The Center for Behavioral Neuroscience Web site is home to a wealth of information about the Center and its upcoming symposia, education programs and more.

Visit the Center's home page often for the latest headlines and a full listing of featured events.

Click on the education menu to find program dates and registration deadlines for the Center's K-12, undergraduate and teacher education programs.

The Web site's directory page is updated frequently and includes a list of all CBN faculty and student members.

Visit the CBN On-line:
www.cbn-atl.org

Synapse Fall 2009
Vol. 9, No. 4

News? Story Ideas?
We want to know!

Call us at 404.413.5464
or e-mail mkoontz@gsu.edu

Editor: Martha Koontz