

Be on the lookout for...

AGNÈS LACREUSE, Ph.D., research assistant professor in the Division of Neuroscience at the Yerkes National Primate Research Center of Emory University, uses behavioral testing and neuroimaging techniques to study the neural and physiological changes underlying normal age-related cognitive decline in a monkey model of human aging. Lacreuse focuses particularly on sex differences and hormonal influences on cognition and neural function. She is a member of the Reproduction Collaboratory.



Agnès Lacreuse



TARA S. STOINSKI, Ph.D., is Manager of Conservation Partnerships at Zoo Atlanta and Director of Research and Education Partnerships for the Dian Fossey Gorilla Fund International. Her primary research interests are the roots of social behavior in group-living primate species, particularly the social dynamics and reproductive strategies of male gorillas in both captivity and the wild. She is interested in investigating the hormonal mechanisms underlying development and reproduction in both male and female gorillas. Stoinski also hopes to develop education programs at the zoo to educate the public about the science of animal behavior.

Tara Stoinski and Zoo Atlanta gorilla Ozzie.

Holiday Party Stars CBN Musical Talent

More than 100 CBN members and their families enjoyed food and entertainment at the CBN Holiday Party on Dec. 16 at the Miller-Ward Alumni House at Emory University. Featured CBN musicians included Liz Hammock, Hemu Nair, Alex Olveido, and Michael Wesley who played and sang original scores.



Michael Wesley

Emory Health Sciences Magazine Features CBN

The winter 2004 edition of *Momentum*, the quarterly magazine of the Woodruff Health Sciences Center of Emory University, features an in-depth cover story on the CBN. The magazine can be downloaded in pdf format at <http://www.emory.edu/WHSC/HSNEWS/PUB/Momentum/>.



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Zoo Exhibit Showcases Crayfish Behavior

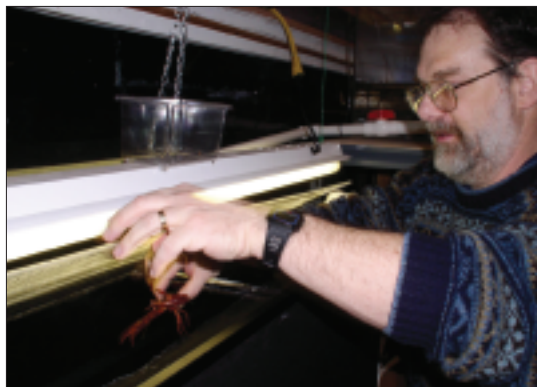
Zoo Atlanta and the CBN have developed a new interactive exhibit focusing on crayfish and the science behind its behaviors.

Located in the zoo's World of Reptiles, the exhibit features an aquarium ecosystem with plants, a mud bank and a burrow for adult and juvenile crayfish and their prey of snails and fish.

An accompanying DVD movie includes exciting footage of crayfish, which resemble miniature lobsters, engaged in a variety of behaviors, such as foraging, mating, fighting and escaping from predators.

The exhibit's most novel feature is a touch-screen kiosk that provides an opportunity for visitors to simulate behaviors by creating virtual crayfish with different personalities. The exercise demonstrates the interrelationships among different behaviors that

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Don Edwards places a crayfish in the exhibit's aquarium.

Reward Mechanism Involved in Addiction Likely Regulates Pair Bonds Between Monogamous Animals

The reward mechanism involved in addiction appears to regulate life-long social or pair bonds between monogamous mating animals, according to a CBN study of prairie voles published in the January 19 edition of the *Journal of Comparative Neurology*. The finding could have implications for understanding the basis of romantic love and disorders of the ability to form social attachments, such as autism and schizophrenia.

In their research, Affiliation Collaboratory Head Larry Young, Ph.D., CBN Graduate Scholar Miranda Lim, both of Emory, and Anne Murphy, Ph.D., associate professor of biology at Georgia State University, examined the distribution of two brain

receptors in the ventral forebrain of monogamous prairie voles that have been previously tied to pair bond formation: oxytocin (OTR) and vaso-

pressin V1a receptor (V1aR). Using receptor audiographic techniques, the scientists found that these receptors are confined to two of the brain's reward centers, the nucleus accumbens and the ventral pallidum. V1aR receptors,

which are thought to be activated in the male vole brain during pair bond formation, were confined largely to the ventral pallidum. OTR

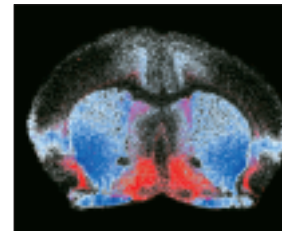
receptors, which play a crucial role in pair bond formation in females, were found mainly in the nucleus accumbens.

The V1aR and OTR receptors did not overlap between the two brain regions, and were equally distributed in the brains of male and female voles. According to Young, the findings, coupled with the close proximity of the nucleus accumbens and ventral pallidum—two regions with heavily interconnected structures—suggest that a common neural circuit in male and female voles regulates pair bonds.

Past studies have found the dopamine system of the nucleus accumbens is involved in mediating the rewarding and sometimes addictive effects of sex, food and drugs of abuse. Young believes the same reward pathways are likely stimulated during and following pair bond formation.

“Although the process of pair bond formation results from the activity of

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A cross-sectional view of the ventral forebrain of a monogamous prairie vole shows the distribution of oxytocin (blue) and vasopressin V1a receptors (red).

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Editor: Poul E. Olson

Considering More Creative Research Approaches

I want to take this opportunity to thank everyone who participated in the Research Retreat on February 7 at Zoo Atlanta. After presentations by each of the collaborative heads and new CBN faculty members, we had a lively discussion about the future of the Center's research program.

The consensus among the group was to continue with the existing collaborative structure that has taken some time and effort to build and works well. We recognized, however, the need to consider more creative approaches, such as hybrid laboratories focused on areas of common interest (e.g. the medial amygdala, drug addiction, etc.). As we continue to develop our research strengths, we clearly must adapt our investigative approaches in some way. I invite all of you to enter this debate through your laboratories.



Elliott Albers

I recognize the success of any new research organization will hinge on enhancing the sharing of data and ideas. Working with our new Information Technology Manager Rob Poh, I am firmly committed to developing a comprehensive strategy to address our communication challenges, particularly through the more effective application of video-conferencing and web technology. ■

Elliott Albers

Faculty Publications

Bielsky, I.F., Bao-Hu, S., Szegda, K.L., Westphal, H., Young L.J. Profound impairment in social recognition and reduction in anxiety-like behavior in vasopressin V1a receptor knockout mice. *Neuropsychopharmacology* (2004, in press).

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Miranda, J.A., Oliveira, R.F., Carneiro, L.A., Santos, R.S., Grober, M.S. Neurochemical Correlates of Male Polymorphism and Alternative Reproductive Tactics in the Azorean Rock-Pool Blenny, *Parablennius parvicornis*. *Gen Comp Endocrinol* (2003) 132:183-189.

Jasnow, A.M., Cooper, M.A., Huhman, K.L. N-Methyl-D-aspartate receptors in the amygdala are necessary for the acquisition and expression of conditioned defeat. *Neuroscience* (2004) 123:625-634.

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Pair Bonds Are Addictive

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two different neurochemicals in separate regions of the ventral forebrain in male and female vole brains," said Young, "the OTR and V1aR systems appear to activate two separate nodes of the same reward pathway to form and reinforce pair bonds."

In another finding, the CBN researchers determined that OTR and V1aR are closely located near the nerve fibers that release oxytocin and vasopressin. Lim speculated that their proximity likely facilitates pair bond formation during mating.

CBN studies currently underway continue to examine other components of the neural circuit involved in pair bond formation in the monogamous prairie vole. ■

prairie vole (*Microtus Ochrogaster*). *Journal of Comparative Neurology* (2004) 468:555-570.

Ressler, K.J. and Nemeroff, C.B. Molecular Mechanisms Regulating Behavior: Focus on Genetic and Environmental Influences on Behavior. In: Psychiatry Section, Ressler & Nemeroff eds., *Principles of Molecular Medicine*, Eds. Runge M, and Patterson C. Humana Press: New York (2004).

Rothbaum, B.O. and Davis, M. Applying learning principles to the treatment of post-trauma reactions. *Annals of the New York Academy of Sciences* (2003) 1008:112-121.

Cushing, B.S., Okorie, U., Young, L.J. The effects of neonatal castration on the subsequent behavioral response to arginine vasopressin and the expression of V1a receptors in adult male prairie voles. *J Neuroendocrinology* (2003) 15:1021-1026.

Albers Appointed Regents Professor

CBN Director Elliott Albers, Ph.D., has been named a Regents Professor by the Board of Regents of the University System of Georgia. The appointment, which is afforded select faculty at Georgia State University, Georgia Institute of Technology, the University of Georgia and Medical College of Georgia for a three-year period, recognizes Albers for his exemplary record of teaching, service and research in the Departments of Biology and Psychology, and his outstanding contributions to GSU and the professional community. GSU currently has a total of 13 Regents Professors. ■

Brain Bee Preludes Brain Awareness Month Events

Shane Lu, a junior from Parkview High School in Gwinnett County, captured the 2004 Atlanta Brain Bee in a neuroscience trivia competition held January 31 at the Fernbank Museum of Natural History.

Lu, who bested high school students from around the metro Atlanta area, will go on to compete in the International Brain Bee in March at the University of Maryland.

Joining Lu in the winner's circle were second-place finisher Stephanie Lin, a senior at Chamblee Charter School in Dekalb County, and third-place finisher Lesly Thomas, also a Parkview High School junior.

Each of the winners received gift cards from Borders Books, Inc., a CBN community partner.

Between the written and oral rounds of the competition, a panel of CBN scientists spoke to the students about their careers. The panel included Stuart Zola, Todd Preuss, Melissa Marino and Danielle Gray, Ph.D.s, all of Emory University. Also on the panel were Stephen Stoffel, D.O., of Emory Hospital, and Zoo Atlanta's Tara Stoinski, Ph.D.

The Atlanta Brain Bee, which is designed to raise awareness of neuroscience and the brain, is a precursor to Brain Awareness Month (BAM) in March when the CBN will co-sponsor the Atlanta BrainsRule! Neuroscience Exposition, March 5-6, at SciTrek. On March 5, 178 seventh and eighth grade students from Charles Drew Charter School in Atlanta will visit the Expo where they will judge interactive booths on a range of neuroscience topics. On March 6, the Expo will be open to the public free of charge. For more information, visit http://www.cbn-atl.org/edu_programs/public_education/bam.html.

For BAM, the CBN also is co-sponsoring a free public lecture by Joseph LeDoux, Ph.D., of New York University titled "Emotional Memory: Systems and Synapses" on March 16 at 4 p.m. in the Woodruff Health Sciences Center Auditorium at Emory University. ■



Brain Bee winners first-place Shane Lu (front), second-place Stephanie Lin (rear, left) and third-place Lesly Thomas.

Crayfish Exhibit Opens

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lead to behavioral choice. A hungry crayfish, for instance, may choose not to flee an approaching predator in order to continue eating.

The crayfish exhibit was developed by Aggression Collaboratory Head Don Edwards, Ph.D., of Georgia State University, Zoo Atlanta Curator Sue Barnard, CBN post-doc Brian Antonsen, Ph.D., of GSU, undergradu-

ates Lauren Burns and Aaron Miller of the Georgia Institute of Technology and Oberlin College, respectively, and Isaac Greenbride, an undergraduate at the University of California at Berkeley.

CBN works closely with zoo Atlanta to develop educational programs focusing on behavioral neuroscience. In addition to the new crayfish exhibit, the zoo and CBN co-sponsor a summer workshop for Atlanta middle and high school teachers on animal behavior and the brain. ■

Social Stress Adversely Affects Digestive Function in Subordinate Cichlid Fish



Cichlid fish

Social stress adversely affects digestive function in subordinate cichlid fish, according to a CBN study that appeared in the January issue of the *Proceedings of the Royal Society of London*.

In the research on Central American convict cichlid fish, Georgia State University biologists Ryan L. Earley, Ph.D., and Matthew Grober, Ph.D., and

Morehouse College biologist Lawrence Blumer, Ph.D., compared bile retention and gall bladder size in dominant and subordinate males that had eaten equal amounts of food.

The scientists discovered not only were the gall bladders in the subordinate fish much larger, they were filled with dark "bad bile," unlike the pale bile in the dominant fish. As a result of the difference in gall bladder function, the scientists speculated the subordinate fish grew more slowly than the dominant ones.

Cichlids have rigid dominance hierarchies and provide excellent models for the study of social stress. In their initial encounter, two cichlids will fight one another until they establish a dominant/subordinate relationship. Among other consequences, the subordinate fish has limited access to food and endures the constant threat of aggression from the dominant counterpart. Previous cichlid studies have found that the chronic stress of social subordination also causes changes in body weight and hormone levels.

The CBN scientists believe the latest finding supports a link between social stress and digestive function and could have implications for understanding disorders such as gallstones, a product of excess bile accumulation, in humans.

"Because social stress activates the nervous system of humans in similar ways as it does in fishes," said Earley, "the study could hold clues to evaluating the risk factors that contribute to gallstone formation in people." ■