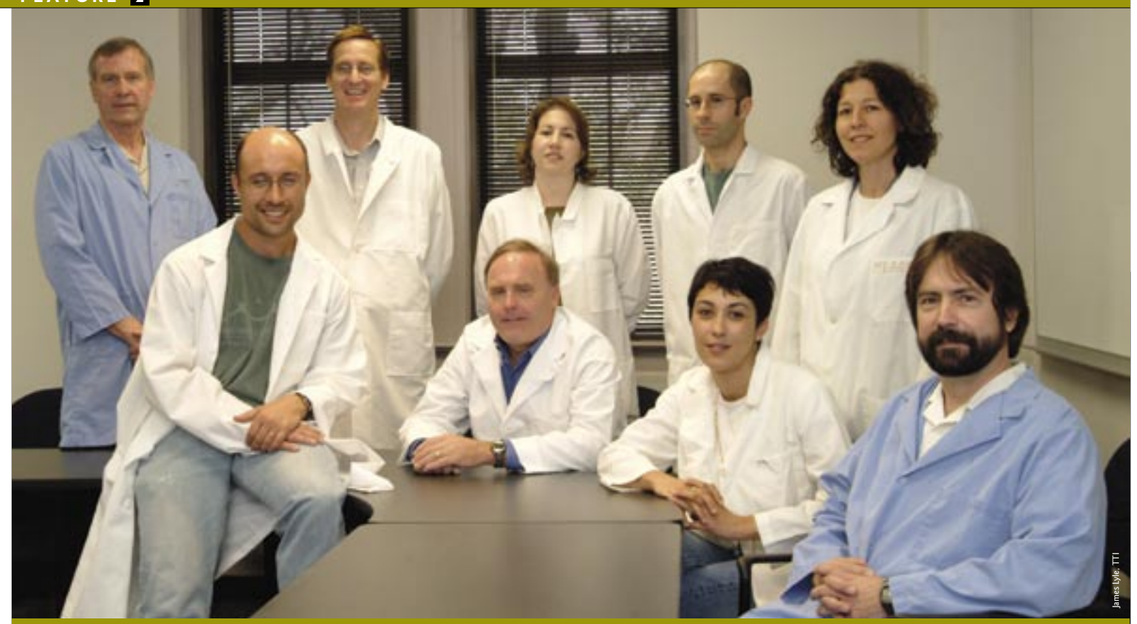
FEATURE 2



Seated L-R: Antonio Cepeda-Benito , Paul Wellman, Michelle Hook, James Grau, Standing L-R: Jack Nation, Mark Packard, Jennifer Bizon, Barry Setlow, Mary Meagher

By Sophia Galvan

Neural Risk Management

Texas A&M University researchers from three colleges are seeking answers in neuroscience research to reverse the loss of function from injury, disease and aging.

If two minds are better than one, imagine what a cadre of Texas A&M's brightest researchers in behavioral and cellular neuroscience can accomplish for the millions of Americans affected each year by the loss of neural function from injury, disease, and aging.

An outstanding team of interdisciplinary faculty, including researchers from the College of Liberal Arts, the College of Medicine and the College of Veterinary Medicine and Biomedical Sciences, are combining their expertise to explore the neurobiological mechanisms that underlie the loss and recovery of function with aging, neurodegenerative disease and neural injury.

The Recovery of Function group brings together expertise on neural injury, neurodegenerative disease, neuroimmunology, and neural plasticity and aging. Uniting these areas are two common themes: (1) the neural environment and (2) repair and plasticity.

"Exploration of the neural environment represents a major shift in neuroscience," says Dr. Mary Meagher, professor of psychology in the Behavioral and Cellular Neuroscience program "We once focused only on neurons, but there is now an increased interest in how factors in the neurons' environment affect disease."

One example of such an environmental factor is stress. Meagher and Dr. Jane Welsh, associate professor in the College of Veterinary Medicine and Biomedical Sciences, are examining how stress alters susceptibility to infectious diseases that later result in autoimmune diseases like multiple sclerosis (MS).

"Theiler's virus infection in mice is used to investigate the role of psychological stress in altering the initial immune response to the acute infection and the persistence of the virus in the central nervous system," explains Meagher. "If the virus persists, it will trigger an autoimmune demyelinating disease that is similar to multiple sclerosis, where the immune system begins to attack the myelin sheath surrounding nerve cells. Using this model, Meagher and Welsh found that mice exposed to stress during early infection developed more severe signs of encephalitis and more severe demyelination and greater motor impairments during the later phase of the infection.

"We have also shown that early life stress, such as maternal separation during the first two weeks of life of an infant, increases vulnerability to virus infection later in life. This suggests that the infant's immune system is undergoing a critical period in development and that this significant early life stressor may increase vulnerability to infectious diseases later in life."

Neuroscience—the scientific study of the nervous system

Neuroscience is a field of study which deals with the structure, function, development, genetics, biochemistry, physiology, pharmacology and pathology of the nervous system. The study of behavior and learning is also a division of neuroscience.

The biological study of the human brain is an interdisciplinary field which involves many levels of study, from the molecular level through the cellular level (individual neurons), the level of relatively small assemblies of neurons like cortical columns, that of larger subsystems like that which subserves visual perception, up to large systems like the cerebral cortex or the cerebellum, and at the highest level the nervous system as a whole.

[Source: http://www.answers.com/topic/neuroscience/]

With the ability to link what is happening in a disease process at the cellular and molecular levels to behavioral and functional changes, Meagher and the other psychologists in the program, including her husband and fellow Department of Psychology Professor Jim Grau, bring a new level of understanding beyond the cellular or molecular level of neuroscience. Linking behavioral changes to cellular mechanisms will help researchers identify treatments designed to restore neural function.

Dr. Grau, who, in recent years, broke new ground when he and his team of researchers demonstrated the spinal cord's ability to learn, hopes to develop new behavioral and pharmacological treatments to promote recovery of function after spinal cord injuries. His work and that of collaborator Dr. Rajesh Miranda, associate professor in The Texas A&M University System Health Science Center,

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Behavioral and Cellular Neuroscience (BCN) Program
Department of Psychology
http://bcn.tamu.edu

Faculty and Research Areas:

Dr. Jennifer Bizon — aging, learning and memory, molecular and cellular mechanisms

Dr. Antonio Cepeda-Benito — theories and treatment of substance abuse disorders

Dr. Jim Grau — learning, pain, recovery after spinal cord injury

Dr. Mary Meagher — pain modulation, psychoneuroimmunology, learning and memory

Dr. Jack Nation — neurotoxicology, drug addiction

Dr. Mark Packard — learning and memory

Dr. Barry Setlow — learning and memory, drug addiction

Dr. Paul Wellman — feeding behavior

This fall, Dr. Shoshy Eitan joined the BCN faculty. Dr. Eitan brings additional expertise in cellular/molecular mechanisms with a focus on opiates and drug addiction.

Grant Funding:
$6.6 million in current funding

Areas of Focus:
- Drug addiction
- Neurobiology of learning and memory
- Recovery of function

Neuroscience at Texas A&M:
The behavioral and cellular neuroscience faculty in the Department of Psychology are part of a large community of neuroscience researchers at Texas A&M (over 50 faculty members across 12 departments), known collectively as the Faculty of Neuroscience. Neuroscience faculty work on research problems ranging from ion channel structure to human behavior. The Faculty of Neuroscience also sponsors a weekly seminar series, an annual conference and a poster session, and provides awards for students to travel to scientific meetings. For further details see the web site at www.bio.tamu.edu/neuro/.

Faculty in BCN also participate in a number of other interdisciplinary research programs, including the Recovery

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of Function (http://recovery.tamu.edu) and Neurotoxicology (http://toxicology.tamu.edu), which provide additional training opportunities through collaborative research, seminar series, and journal clubs.

Undergraduate and Graduate Training:
BCN faculty teach courses on a range of topics, including physiological psychology, learning, drugs and behavior, neurotoxicology, neurobiology of learning and memory, perception, and introductory psychology.

Undergraduates have the opportunity to work with BCN faculty through the independent study program and as University

James Lyle, TTI

Seated L-R: Russell Huie, Audrea Elliott, Elisabeth Good, Denise Puga, Standing L-R: Nicholas Simon, Amanda Gabriele, Angelica Rocha, Stephanie Washburn, Ian Mendez, Not pictured: Robin Johnson, Candi LaSarge

Fellows completing an honors thesis in their senior year. Approximately a dozen graduate students are completing their Ph.D. within the BCN program. Students are teamed up with individual faculty and complete a rigorous program of study that emphasizes laboratory experience and the publication/presentation of their scientific findings. Students are supported during their graduate training through research grants, a Life Science Training Grant, and the Texas Consortium in Behavioral Neuroscience, which promotes graduate and postdoctoral training of individuals from under-represented populations (Hispanic, African-American, Native-American). In addition, students who have completed their Ph.D. at other institutions are obtaining postdoctoral training within the BCN program. As of the fall of 2005, three postdoctoral trainees (Drs. Erin Young, Kyle Baumbauer and, Luis Carcoba) and an advanced research scientist (Dr. Michelle Hook) will be contributing to research, training, and teaching in BCN.

contribute to the repair and plasticity aspect of the team's work. To the more than 250,000 Americans living with spinal cord injuries, Grau's work is not only a victory for neuroscience but also a fresh chance to regain lost faculties.

With funding from the Life Science Task Force Training Grant, the team has created the Recovery of Function Graduate Program in Neuroscience. The unique program aims to train students in basic research in pursuit of treatments that reduce neural loss and promote the restoration of function after neural injury and neurodegenerative diseases. Faculty from each of the three colleges bring their own unique abilities and perspectives to the program and its very complex studies. In the future, the team looks forward to bringing new hope to patients experiencing loss of function. For now, they are busy exploring neuroscience from a whole new angle and, through the training program, fostering the next wave of groundbreakers in behavioral and cellular neuroscience. ■

This story first appeared in the 2005 issue of Advance, Texas A&M University's research magazine.

James Lyle, TTI

L-R: Antonio Cepeda-Benito , Paul Wellman, Jack Nation

What a person puts into his/her body —whether drugs, food, alcohol or nicotine — can affect brain chemistry and thus alter one's ability to control one's consumption. Jack Nation, Antonio Cepeda-Benito and Paul Wellman conduct research that examines how changes in brain chemistry contribute to people's addictions to drugs, smoking and alcohol, as well as to eating disorders. They are also interested in how altering brain chemistry can assist people in fighting addictions and suppressing one's appetite. In addition to their individual research projects, all three have collaborated on journal articles and presentations. Nation and Cepeda-Benito are currently working on National Institute on Drug Abuse (NIDA) grants in this area, and Wellman and Nation have collaborated on a past NIDA grant.

James Lyle, TTI

Photo: James Lyle, TTI

Brian McAllister Linn

Power Pitcher

Two national fellowships and three book awards have put military historian Brian Linn in the big leagues as a respected scholar and teacher His lesson to students: It's all about power.

Growing up in Hawaii during the 1950s and '60s, Brian Linn learned early about the role the military played in national affairs. After all, the signs were everywhere— from pillboxes on Diamond Head to Air Force guards on the beach at Waimanalo to the bases at Pearl Harbor and Schofield to thousands of service personnel on liberty downtown. The military presence on Oahu constantly reminded the locals that what had happened in 1941 could happen again.

"My father, who was in a bomber command during World War II, explained to me at a pretty young age that with Pearl Harbor and the other facilities, Oahu was probably one of the first places the Soviets would target," said Linn.

Linn channeled this awareness into a career as an award-winning history professor who specializes in the study of the U.S. military in the 20th century. He also exhibits a demeanor that could be compared with either the military officers he studies or with a professional athlete.

"Brian is a very hard driving type of guy," says Walter Buenger, professor and head of the Department of History. "He needs to be good at everything he does, and that makes him a very hard worker."

Linn likens it to becoming a baseball pitcher. A pitcher spends years mastering the different pitches, and every time he takes the