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Williams is designing ligands that will bind to copper, zinc and iron, the three metal ions that are instrumental in the development and advance of Alzheimer's disease. He brings a deep personal connection to his research.

"Alzheimer's took my grandfather; this is my way of coming back at it," he said.



Jen Cockrell '10

"I mean, I'm a *sophomore*," Cockrell said, "and I never imagined that I would be doing what I am doing in a laboratory like this! It's really the only way you are going to learn...by getting in there and doing it, jumping in over your head and trying. I really love working here. And I love chemistry. You know, a chemistry experiment doesn't always – or even often – work out the way you want it to. That's a good life lesson to learn."

"My oldest brother got both his undergraduate and master's degrees at UNCW, and he worked in Dr. Hancock's lab last year doing his master's thesis on ligand research. His thesis was recently published in the *Journal of the American Chemistry Society*."

Cockrell is also considering an applied learning internship at PPD. Located here in Wilmington, PPD is a leading global contract research organization (CRO) with offices in 30 countries and clients and partners serving pharmaceutical, biotechnology, medical device, academic and government organizations.

Jen Cockrell plans to get both her master's and undergraduate degrees in five years at UNCW through the Combined B.S./M.S. Program.

— BY KIM PROUKOU '06M

The Brain



PHOTOS: UNCW / JAMIE MONCRIEF

For Julian Keith, working with students in a Directed Individual Study (DIS) is the favorite part of his job as a psychology professor at UNC Wilmington, and one that goes beyond his required teaching responsibilities.

"It is part of the culture here. We know it is something that needs to be done. We couldn't be who we are if we didn't do DIS with students," he said. It is something that permeates the whole department with faculty members supervising three, five, up to 10 students a semester and hundreds over the years.

Most of the students in Keith's lab are doing either DIS work or an advanced honors project. A DIS fulfills the

Lab

BY MARYBETH BIANCHI



Keith's brain lab is localizing where certain areas in the brain accomplish memory activities. Using electroencephalography (EEG), the measurement of electrical activity produced by the brain as recorded from electrodes placed on the scalp, they research a subject seated in a study chair doing problems. Areas of the brain emitting energy or activity turn different colors permitting a visual replication of brain activity.

requirement for applied learning for psychology majors. In Keith's Brain Lab students work in pairs and/or collaborative teams or lab groups mastering methods used for analyzing behavior, psychopharmacology, neurosurgery, as well as techniques for visualizing the structure of the brain at the microscopic level. "Our laboratory studies memory and memory disorders with special emphasis placed on restoring memory function after brain injury, 'regenerative neuroscience,'" Keith explains.

"The psychology department has always emphasized – even when I was an undergraduate student here – the importance of students being actively involved," said Keith, who graduated from UNCW in 1983 with a

degree in psychology. "I was completely swept up by the chance to actually do science, absolutely nothing else like it excited me that much."

"Mark Galizio (department chair) talks about the student as a research colleague. He treats his students that way. I was his DIS student, and I think I've always tried to emulate how he helps students enter into a scientific career."

Keith said most of his DIS students go on to graduate or medical school or land impressive jobs right out of college. "They go on to be movers and shakers in their fields. We've had great success with DIS students going off and getting great gigs elsewhere."

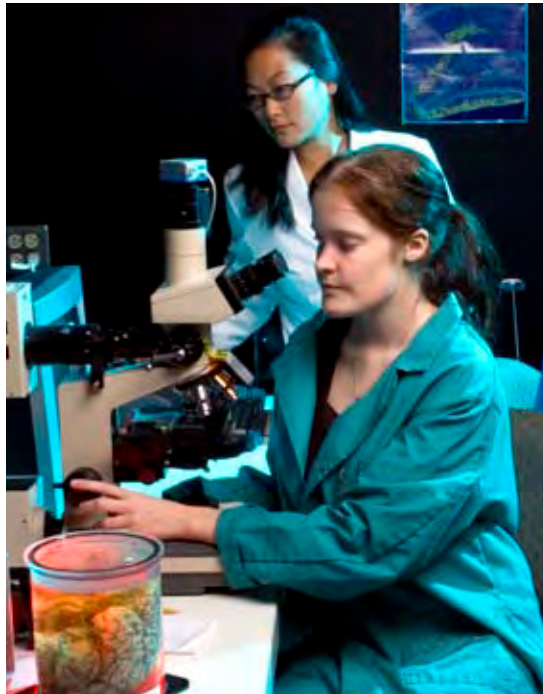
“They do this with the toolkit we give them to work with that you can’t get by sitting in a class. That’s the cool thing for me – you see them get to learn to do something productive,” Keith said.

In Keith’s Brain Lab, which is funded by grants from the National Institute for Mental Health and the National Science Foundation, students study memory and memory disorders. The research focuses on promoting the birth of new neurons in an area of the brain called the hippocampus.

“Almost always students come to you because they’ve heard of your research – in class, from the Web site, other students,” Keith said. “There is no shortage of really good students on this campus who want to be brain researchers.”

In the Brain Lab, students learn and master methods used for analyzing behavior, psychopharmacology, neurosurgery and techniques for visualizing the structure of the brain at the microscopic level, including immunofluorescence cell labeling and laser scanning confocal microscopy.

The work is not glamorous, in fact, Keith said it can be very tedious – “sometimes counting brain cells – you have hundreds of billions of them – it takes determination, commitment, unlike just showing up for class.



Research assistant Emily Kidder '05 and student Nicole Matheson view tissue taken from the hippocampus, a brain region involved in long-term memory. They are counting the neurons that express a protein called doublecortin, found only in recently born, immature neurons. Neurons in the doublecortin stage of development are able to grow new connections within neural circuits more efficiently than older mature neurons. Thus, we believe that these new neurons are especially important for the formation of new memories. This research is vital to advancing restoration of brain function due to injury, damage or diseases of the brain.



“It’s not easy. It’s enormously difficult to do research – some are addicted to the challenge, others find out they aren’t cut out for it,” he said.

In collaboration with Memory Assessment and Research Services, LLC, the laboratory also studies human memory and subtle changes in memory performance that are early indicators of the onset of diseases such as Alzheimer’s dementia (see www.memoryassessment.com). Another component of the human memory research, in collaboration with Lloyd Smith (president, Cortech Solutions, LLC), involves measuring the electrophysiological activity of the brain while new memories are being formed and already established memories are being accessed. One goal of the work with Cortech Solutions is to identify brain activity patterns associated with accurate versus inaccurate memory recognition.

Directed Individual Studies inspire not only the students who participate, but also the faculty, who voluntarily take on the additional responsibilities.

Keith said, “You realize that this is what you’re really here for. When students want to learn how science is really conducted, it’s a lot more fun. I never teach as well as when I have students in the lab – that’s the highest quality teaching I do.”