2011

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CUNY Bernard M Baruch College

Regional

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College Talk

Some scientists have calculated that there are more than 400 billion cells in the human brain. No wonder it is said that this is the most complex organ of any organism on earth. Despite its importance and the thousands of scientists that work on this essential part of our bodies, we still don't have a firm grasp on some of its basic functions, such as how learning and memory works.

A researcher working to answer some of these big questions is Faith Liebl.

Born in Iowa Falls, Iowa, she received her bachelor's degree in psychology at the University of Wisconsin at Green Bay, her master's degree in biopsychology at Southern Illinois University Carbondale and her doctorate in neurobiology at the University of Illinois at Chicago.

Today she is an assistant professor in the department of biological sciences at Southern Illinois University Edwardsville.

The daunting task of understanding how learning and memory work in the human brain did not deter Liebl from doing research on it. In fact she decided to get into it, she said, because of its complexity.

"It came from my interest in counseling psychology and from there I became fascinated with how it works, how we learn, how we remember, how we access our memories," Liebl said.

Most people don't realize that in order to understand the brain you not only have to study its anatomy but its chemistry as well because the basis of brain functions has to do with the way chemical signals are sent and received.

"The brain integrates all of the sensory information, vision, hearing, taste, etc., and then generates an output," she said. "Brains are faster than computers at processing because they can do things in parallels."

Liebl has been working on how we learn and remember information.

"We don't understand it that well," Liebl said. "At the cellular level it appears that short-term memory arises from an increase in the number of proteins in the cell membranes.

"They can be converted into long-term memories by cells remodeling themselves. Then you have cells that form circuits in the brain and that helps to form larger pictures in our minds."

Despite its complexity, the fact of the matter is that the brain is a very "plastic" organ, giving humans our ability to be trained to do many different things.

"Brains can be trained in many ways. And the best way to do that is by making connections. The way to study is not to memorize, but by understanding," said Liebl, who said that she advises her students along those lines.

In order to understand how learning and memory work, Liebl has been studying a chemical substance that plays a major role in those processes: glutamate.

Since glutamatic acid is found in many foods, some people wonder if eating those foods could help to improve one's memory.

"Glutamate is not able to cross cell membranes, including the blood-brain barrier. That won't work," Liebl said. "Claims made to that effect don't have much credence."

To understand how learning and memory work in the human brain, Liebl studies the brains of an unlikely source — the fruit fly.

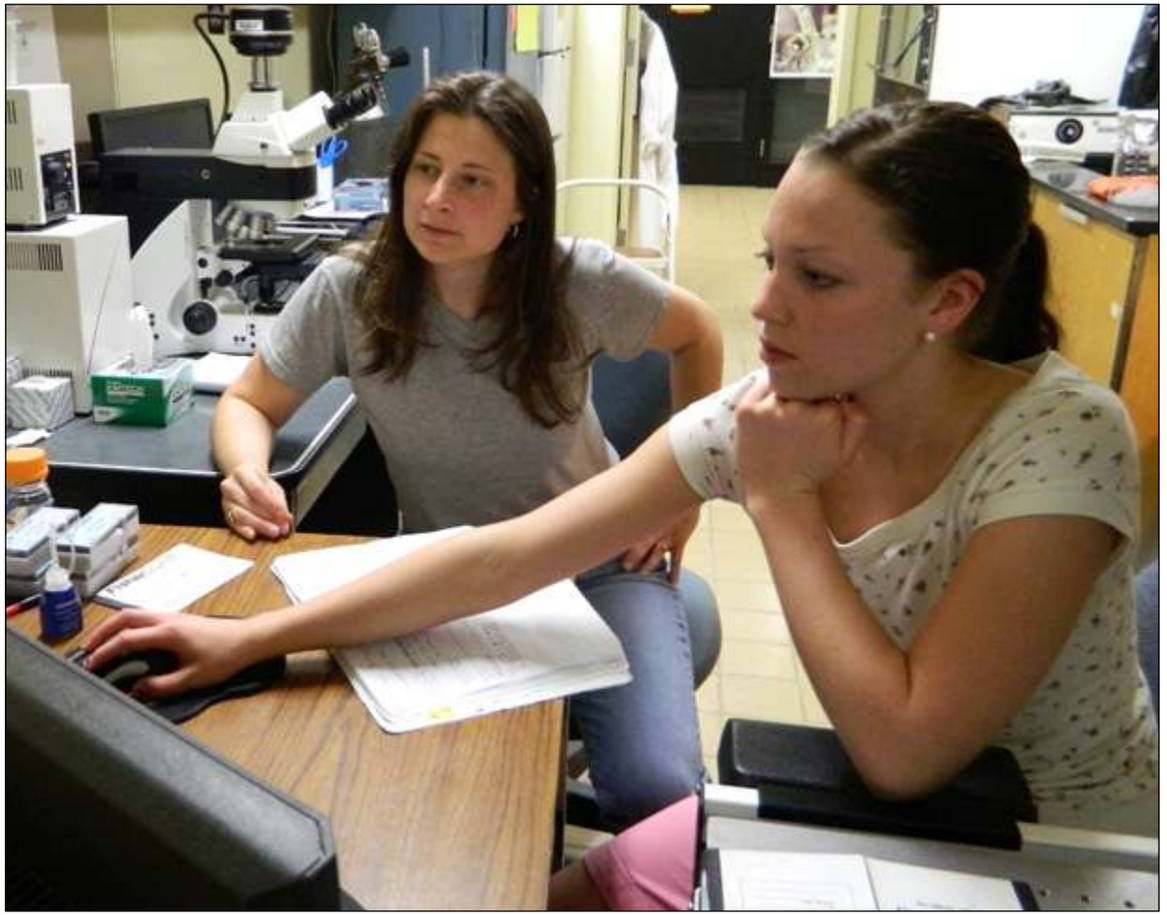
"As a Ph.D. student I was surprised to learn how these little guys have glutamate receptors very similar to humans. They have been used for over a decade now for research," Liebl said.

"We know very little about these receptors and the pharmaceutical industry would like to know more. Fruit flies are inexpensive organisms that reproduce very fast — every 18 days — so we can experiment with them and their genetics, something we could never do with humans."

Among the courses she teaches at SIUE is neurobiology. She has seen how intrigued her students are about the complexity of the human brain.

Despite her efforts and those of thousands of other scientists around the world, she said that she is not very optimistic that we will get final answers about how the human brain works in the foreseeable future.

"I don't believe we will understand the human brain in many generations to come," Liebl said. "Just look at a single cell. We don't even understand all that is going on there. Imagine an entire organ. How do you take groups of single cells and explain how one thinks?"



Shan Lu/SIUE

Professor Faith Liebl (left) working in the lab with Denise Hand, a senior biology student.

Despite that challenge, students keep coming to her to see how they can learn more about the human brain.

"Most students are very curious," she said, "and that is what makes them become interested."

Aldemaro Romero is the Dean of the College of Arts and Sciences at Southern Illinois University Edwardsville. His show, "Segue," can be heard every Sunday morning at 9 a.m. on WSIE, 88.7 FM. He can be reached at College_Arts_Sciences@siue.edu.