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Regional

Genetics answers questions and raises more

Hardly a day passes without stories in the news concerning human genetics. Whether it is about new research into the genetic causes for illness, obesity, or even editorials concerning the use of stem cells in genetic research, the average American is bombarded with news about genetics. Someone who teaches about the marvels, latest discoveries and controversies surrounding genetics is Amy Hubert, an assistant professor in the department of biological sciences at Southern Illinois University Edwardsville. Despite the popularity of the subject, Hubert had a very personal reason why entered the field.

"My undergraduate genetics class was really interesting," Hubert said. "I actually started out my undergraduate career as chemistry major, but I realized about halfway through that I really enjoyed my biology classes that I was taking as electives more than I enjoyed the chemistry classes. So I took genetics class and really enjoyed it and the lab that went with it." A native of Concordia, Kan., she obtained her bachelor's degree in biology from the University of Kansas and her doctorate in genetics from the University of Wisconsin- Madison. After switching majors, she became more and more interested in molecular biology, which is key for understanding the workings of heredity.

"One of the emphasis options was genetics and since I enjoyed the class so much that's the one I chose," she said. "That's what I got my degree in and just went on from there." These days she is working on a rapidly evolving field: the regeneration of the nervous system. This is research that is really entering a new frontier of science. In her work she studies microscopic organisms. One question many people ask is if they can regenerate the nervous system of a worm, why not a human?

"It's a little more complicated than that," explained Hubert. "The worms are actually a few millimeters long. While you can see them with the naked eye, we study



Dr. Amy Hubert in her lab.

Courtesy of Amy Hubert

them with a microscope. And they have this amazing ability to regenerate any of their body parts, including their nervous system. That is due to this population of stem cells that they maintain throughout their lifetime that lets them make new cells, including nervous system cells."

Although humans are quite a bit more complicated, Hubert said that scientists are hoping that some of what they learn from the worms is applicable, particularly in relation to stem cells.

"Stem cells are cells that have the ability to replace themselves," she explained. "So they can divide and make another stem cell. Or they can divide and create a cell that goes on to differentiate, a process in which it takes on characteristics of other cell types." Examples of those cells are the ones we find in the muscle, heart, or skin tissues.

"The characteristics of stem cells are that they have those abilities to both replace themselves and create more stem cells so they can proliferate, or they can differentiate and make other types of cells. So they are capable of producing other cells that are necessary for other functions." Another concept one commonly hears in the media is that there is a gene that controls everything, but what about environmental influences?

"Identical twins have the same exact genes. So if you see differences between identical twins reared in different environments, or even in the same environment, then you can use that to calculate what percentage of that trait or behavior or whatever you are measuring is controlled by genetic influences versus what percentage is controlled by environmental influences," she explained.

"What we see is that any complex trait is going to be a combination of both the genetic and environmental components," she added. "Also using fraternal twins, who share half of their genes, we can compare the differences in the similarities in identical twins and the similarity between

Aldemaro Romero Jr. College Talk

fraternal twins. We can start to get at what parts of the traits involve genetics and what parts involve the environment."

Despite the fact that each offspring has 50 percent of the genes of each parent, not all genes are the same when it comes to dominance in the characteristics they express. That is why siblings can be very different from each other. "It's all a random mixture, and sometimes it turns out that you look more like one parent than the other," Hubert said.

Research is not the only thing that Hubert does. She also teaches and has been involved in programs about science education, a subject that concerns her a lot. The United States ranks number 27 in math and 25 in science in the world. Yet, Hubert is hopeful about the future of science literacy in America.

"I think for little kids science is really exciting," she said. "Like doing simple experiments, there is a wonder to science that really appeals to some kids. But then somewhere along the way they get the idea that science is hard and they can't do it and they just sort of drop off in that excitement of discovery and things like that. I believe that if there were a way to continue that excitement through college in our students that would help create a more informed public. Even if those students aren't going to go on to be scientists, I think it is important for everyone to know basic scientific principles to understand how the world works."

Aldemaro Romero Jr. 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.