

## ***Penn State team questions dogma in synthetic biology events***

Friday, December 14, 2012

UNIVERSITY PARK, Pa. -- Six Penn State students recently participated in a competition in Boston that examined the building blocks of life. It was an experience they won't soon forget.

They qualified for the international event sponsored by the Massachusetts Institute of Technology -- which involved 190 collegiate teams with nearly 3,000 participants from more than 30 countries -- by winning gold at a regional synthetic biology contest earlier in the fall in Pittsburgh.

The International Genetically Engineered Machines competition, better known as iGEM, focuses on a fairly new area of biological research that uses different perspectives to design and construct new biological functions and systems not found in nature.

"Molecular biology and regular biology look at sequences that are already there, in nature," said Hannah Jepsen-Burger, of Reading, Pa., one of Penn State's iGEM team members. "Synthetic biology is based on the concept that you can manipulate to enhance the quality of life."

As a food science major [1] in the College of Agricultural Sciences [2], Jepsen-Burger was not expecting a synthetic biology competition to relate to her goals. As it turned out, she got a closer look at microbiology, a subject within food science that interested her.

Other team members included Victoria Heasley, a junior biological engineering major from Greensburg; Chris Cetnar, a junior biology and vertebrate physiology major from Cranberry Township; Kait Levin, a junior biological engineering major from Meridian, Idaho; Kevin Thyne, a junior molecular biology and biochemistry major; and Alexander Woskob, a junior at State College Area High School.

Howard Salis, assistant professor of agricultural and biological engineering, and Tom Richard, professor of agricultural and biological engineering and director of the Penn State Institutes of Energy and the Environment, co-mentored

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the team along with graduate students Nikki Kapp, Jyotsna Lavanya Pandey and Thomas McCarthy.

The iGEM competition requires teams of undergraduate students to use a kit of biological parts from the Registry of Standard Biological Parts. Student teams around the world work at their colleges and universities during the summer and use these parts and new parts of their own design to build biological systems and operate them in living cells.

Penn State team members worked diligently in the lab all summer and into the school year on their research, struggling to prepare for the regional competition, which was held at Duquesne University Oct. 13 and 14.

"At first, we had no idea what we were doing in the lab," Jepsen-Burger said. "We were off to a pretty slow start, and I think a lot of us were despairing of ever finishing the project in time.

"As we started to learn and think critically in the lab, we developed as a team and learned what was okay and what was not okay to ask of other people. We really meshed well together. By the end of the summer, we were at a good spot."

After a shaky start, the team came up with its theme, "Questioning the Central Dogma of Molecular Biology." The Central Dogma is the commonly held belief that within biology, information flows from the order of nucleotides in DNA to the order of nucleotides in RNA and finally to the order of amino acids in a protein. These proteins then go on to complete a variety of functions that make life work.

The Central Dogma is the foundation of modern-day synthetic biology, molecular biology and microbiology. While countless innovations in medicine and technology are based on the truth of the doctrine, it does not always accurately predict results in the lab, according to Jepsen-Burger. The team decided to take certain instances in which this was the case and dig deeper to find out why.

"Some researchers don't have the time to really investigate why their projects aren't working or why some interesting thing happens in their project," she said.

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Although the team did well, the competition was much stiffer at the international event. Jepsen-Burger was amazed by the complex nature of research being done by undergraduate students around the world.

"I'm honored that I was able to be in such a huge competition and that we were able explore the outer edges of synthetic biology," she said.

Links:

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[1] <http://foodscience.psu.edu/majors>

[2] <http://agsci.psu.edu/>

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