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Virtual iGEM Giant Jamboree sees University of Lethbridge-supported teams garner silver and bronze

University of Lethbridge-supported teams earned silver and bronze medals as the International Genetically Engineered Machines (iGEM) Giant Jamboree took place in the virtual space recently.

The annual celebration of synthetic biology and genetic engineering is usually hosted by the Massachusetts Institute of Technology (MIT) in Boston, MA and was moved online as a result of the COVID-19 pandemic. Still, 4,000 participants attended, with the U of L represented by its collegiate entry and the Lethbridge high school team.

Both groups chose to tackle problems related to agriculture, with the collegiate team presenting FriGEM, a project aimed to fight post-harvest potato diseases, and the high school entry's tPectin-ACE project, which focused on creating a biological catalyst to accelerate compost degradation.

Collegiate (bronze medal)

The university team worked extensively with Dr. Dmytro Yevtushenko, the U of L's Research Chair in Potato Science, and research associate Dr. Mariana Vetrici. Their project aims to fight post-harvest potato diseases caused by Fusarium and other plant pathogens by using targeted expression of antimicrobial peptides (AMPs) in tubers. They were awarded a bronze medal standing for their work.

The team has become fascinated with this diverse group of small, naturally occurring peptides (also called host defense peptides) that are part of the host innate defense system against pathogen invasion. By engineering the AMP-expressing potato plants, less pesticides would be required to combat plant diseases.

"The COVID-19 restrictions made it especially difficult to complete experimental laboratory work this year," says second-year chemistry student Mark Lea. "Ebven though we only had a short time to experiment on the potato plants and obtain preliminary results, that work will be very helpful in the continuation of our project."

The team is also exploring the suitability of potato tubers as a low cost, safe and efficacious platform to produce therapeutic AMPs. In particular, they test the hypothesis that a targeted, high-level accumulation of therapeutic BMAP-18 peptide in potato tubers retains its direct toxicities to trypanosomes, the causative agents of sleeping sickness, which may lead to the development of edible therapeutics.

“It’s amazing how much work the undergraduate students got done on their personal computers before they could get access to campus, work that I could not have achieved by myself in such a short time,” says Dr. Vetrici.

Check out their promo and project videos, wiki and poster for more information.

University of Lethbridge team members included: Deepika Anupindi, Sara Balderas, Abel Belay, Trinity Deak, Rowan Fehr, Seanna Goeseels, London Gokarn, Rebecca Ha, Emily Hagens, Ilyanna Janvier, Dia Koupantsis (student leader), Mark Lea, Reece Martin, Mehreen Kabir, Joshua Omotosho. Supervisors/advisors were Justin Vigar, Fabian Rohden and Dr. Angeliki Pantazi.

High School (silver medal)

The high school team focused its project on creating a biological catalyst to accelerate compost degradation via enhanced pectin digestion. The group collaborated with City of Lethbridge Waste and Recycling officials, local restaurants and researchers at the Agriculture and Agri-Food Canada Research Centre.

Using unique pectin degradation enzymes from the organism *P. amylolyticus*, the team engineered a system that would accelerate the breakdown of homogalacturonan, a major component of pectin. The engineered enzymes would also be heat stable, ensuring they survive the high temperatures required for efficient composting. While initially designed for use in at-home composters, discussions with Lethbridge Waste and Recycling engineer Bill MacMillan led the team to pivot their project to target industrial compost facilities instead. The team intends to continue work on the project in 2021.

Their project was awarded a silver medal and was nominated for Best Integrated Human Practices.

“We’re super proud of what we could accomplish this year and really happy the judges liked our work,” says team member and project presenter Thomas Byrne, a grade-12 student at Winston Churchill High School.

You can watch their promo or project videos, read their wiki and check out their poster.

Lethbridge high school team members included: Shada Aborawi, Rebecca Avileli, Jasmine Belisle, Thomas Byrne, Wenyu Chen, Kimoya Edwards, Olive Graham, Linda He,

Livia Kadezabek, Xinhong Li, Dominic Piper, Declan Sander, Lana VanGenderen, Elisha Wong, Marissa Wong, Michelle Wu, Damian La Rosa Montes (Grad Student Advisor), Kristi Turton (Grad Student Advisor), Luke Saville (Mindfuel Advisor), Jalyce Heller (Primary Investigator), Dr. Laura Keffer-Wilkes (Primary Investigator).

Both teams were supported by the U of L Department of Chemistry & Biochemistry, Alberta RNA Research and Training Institute (ARRTI), SynBridge, the Regional Innovation Network of Southern Alberta (RINSA), Agility, and the University of Lethbridge Students' Union (ULSU).

The full iGEM Giant Jamboree experience is also available to view on the iGEM website.

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