Summary of MSU iGEM 2022

MSU iGEM 2022: Capsid Kings

The 2022 MSU iGEM team was successful once again and brought home a bronze medal from the Giant Jamboree, which was hosted in Paris for the first time this year. Beyond winning a medal at the competition, the team also won a competitive grant from the iGEM Foundation. This year's team consisted of 5 students majoring in Biochemistry and Molecular Biology or Biology.

CAPSID KINGS

Michigan State University

This year, the students worked to engineer bacteriophages that infect the plant pathogen *Pseudomonas syringae*. This bacterial pathogen causes frost damage, necrosis, and decreased yields in a variety of crops, including cherries, tomatoes, and peas. Phages could be used to prevent and treat *P. syringae* infections in the field but there are challenges for implementation, including low stability of phages on the leaf surface. The team added a tag to the phage capsid that will enable them to attach any protein of interest to the capsid. They hope to attach proteins that will improve UV resistance and stability of the phages in the environment. Toward this goal, the team has use advanced modeling techniques to visualize the capsid structure and propose ideal location for the tag.

This project was an excellent fit with the strength of agricultural and structural biology research at MSU and the students benefitted from expertise on campus. The team worked with Dr. George Sundin and his research group throughout the spring and summer to identify key challenges to agricultural phage therapy and ways to address them. The team also learned from the phage and structural biology expertise of Dr. Kristin Parent and her research group, especially Dr. Sundharraman Subramanian. The team used Dr. Parent's protocol for phage isolation and were lucky to image some of their phages at the RTSF cryo-EM facility with Dr. Subramanian. The team made excellent progress and hope that a future MSU iGEM team will continue the project.

This was also the first year that MSU iGEM used a dedicated laboratory space for their summer research. The team worked in the new STEM building, allowing them the space and resources to conduct their project independently while maintaining guidance and supervision from instructors working in the building, including Dr. Jennifer Kirk, and mentors from other buildings who visited regularly. The mentors look forward to continuing to build the structural supports necessary for the team's continued success in research and the iGEM competition.