On the 2019 CUSJ Research Symposium Honorable Mentions

Alex Maddon

Following our annual CUSJ Symposium this year, we were extremely proud to announce three honorable mentions — Nikita Mullick, Justin Oh, and Niyasha Wijedasa! These three students impressed us with not only their research, but also their ability to effectively convey their complex projects in a coherent and digestible way. Congratulations once again to the CUSJ Symposium honorable mentionees! Read about them below:

NIKITA MULLICK

Nikita Mullick is a third-year undergraduate Biology B.S. student at Emory University. She works in the Jacob Lab at Emory Vaccine Center. She attended high school at University School of Milwaukee in Wisconsin where she did research in the Benjamin lab at the Cardiovascular Research Center of Medical College of Wisconsin and had a three-year research internship at BioSource Inc. In the Jacob Lab, Nikita works to discover novel antiviral agents to fill gaps where vaccines and drugs are ineffective or nonexistent. Host defense peptides (HDP), produced innately by animals, can target common motifs on pathogens to help protect the animal from infection and could be harnessed for use against viruses. The aim of her project is to find HDPs that have antiviral activities to improve the breadth of peptide-based drugs. In this study, nine peptides that have sequence homology to a known King Cobra HDP were discovered through genomic scanning of various species. Toxicity against human erythrocytes and antiviral activity against two influenza viruses were analyzed. Three new snake peptides and one wallaby peptide were found to be non-toxic and have shown significant antiviral activity *in vitro*. These candidates are being further investigated for use as antiviral therapeutics.

JUSTIN OH

Justin Oh is a junior in the Academy for Advancement of Science and Technology at Bergen County Academies (BCA) in Hackensack, New Jersey. Apart from doing research, Justin is the Founder and Organizer of BCA Flash, an annual event where BCA students teach STEAM topics to approximately 300 middle schoolers, Co-President of his school's Model United Nations Club, and a Scholastic Art winning photographer. In terms of his research, he began to focus on ovarian cancer, one of the deadliest gynecologic cancers in women, beginning March 2017. The treatment used in his project is Hydrangea Root (HR), which is known to naturally treat urinary tract infections like kidney stones made of Ca^{2+} ions. SKOV3 cells, the human ovarian cancer cell line, depend on Ca^{2+} ions to thrive in the body. The HR can cause a decrease in epidermal growth factor-induced Ca^{2+} influx, which originates from the TRPC3 protein expression in SKOV3 cells. The reduction in Ca^{2+} ions will cause the SKOV3 cells to enter autophagy due to the absence of calcium ion transfer and a decrease in ATP levels. Thus, the SKOV3 cells will eventually die in the presence of HR. By conducting this research, Justin hopes to create an effective, natural treatment that can inhibit proliferation of ovarian cancer cells.

NIYASHA WIJEDASA

Niyasha Wijedasa is a rising senior on the Pre-Dental track. Although she has just been introduced to research this past semester, she became so passionate about her work, making the countless hours spent in the lab enjoyable. Her love for dentistry prompted her to pursue a research topic in dental tissue engineering. To combat the issue of enamel erosion, which is irreversible, she constructed a scaffold which would aid in the cellular proliferation, organization, and differentiation of primary gingival fibroblast cells in hopes that it could be used for further research in enamel regeneration. To devise this scaffold, hydroxyapatite, the major constituent of enamel, was extracted from fish scales. Then it was integrated with polygalacturonic acid, a pectin derivative found in plant cell walls, to form a gelatinous matrix similar to the extracellular matrix of natural dental enamel. Nanofibers were incorporated to serve as the backbone of the scaffold and increase biocompatability. Lastly an amelogenin protein, responsible for the biomineralization of enamel, was combined with the scaffold to further mimic the properties of the dental enamel matrix. Once the scaffold was complete, their biocompatibility was tested in conjunction with the primary gingival fibroblasts.

Figure 1. *Pictured are the three 2019 CUSJ Research Symposium Honorable Mentions – congratulations!*