Welcome to the 16th Annual P.U.R.E. Symposium! *Fall Session*

Thursday Nov 21st, 2019, LSF 207

(Different location than usual!)

Snacks 3:45, Talks begin at 4pm

This Semester's Presentations and Speakers:

4:00 – 4:20pm:

"Investigating Transduction Efficiencies of Gene Therapy Vectors."

Student: Luke Fennell; Faculty Mentor: Dr. Jennifer Lyles.

Gene therapy is a cutting-edge technique used to treat genetic disorders by introducing a functional copy of a mutated or absent gene. This type of treatment requires a vector for delivery of the functional gene, and among the most successful gene therapy vectors is Adeno- associated virus (AAV). Gene therapy using AAV vectors has demonstrated tremendous success over the last decade, including the approval of the first commercially available gene therapy treatment for clinical use. AAV vectors are known for their long-term persistence following a single administration of the vector, a property that is critical to the success of the therapy. A potential barrier to long-term persistence is the initial entry of the vector into the host cell. It is known that different "serotypes" of AAV have different affinities for various cell types. Traditionally, AAV-2 has been the most widely used and widely studied serotype. However, it has been demonstrated that alternative serotypes may have greater affinities for certain cell types than AAV-2, resulting in greater transduction efficiency and ultimately a greater therapeutic effect. As a result, the field has shifted towards the use of alternative AAV serotypes depending on the target tissue – for example, AAV-9 is now used to target hepatocytes (liver cells). Additionally, AAV vectors may contain either single-stranded (ss) or self-complementary (sc) genomes. The configuration of the vector genome upon nuclear entry has also been shown to have an effect on transduction efficiency. While preliminary data demonstrates that both the vector serotype and genome configuration affect transduction efficiency, there is still much characterization that needs to be done. Characterizing the transduction efficiencies of each AAV serotype in common laboratory cell lines and cataloging this information will aid in establishing a vector "toolkit". Researchers and clinicians will be able to use this information to ensure that the most suitable vector is being used for the appropriate target tissue or cell line in order to maximize transduction efficiency and therapeutic effect. Specifically, the transduction efficiency of AAV-DJ—a newly engineered serotype of AAV with a hybrid capsid derived from eight serotypes—is being investigated in two human cell lines, HEK293 cells and HeLa cells. AAV-DJ is currently a leading candidate for liver gene therapy.

4:20 – 4:40pm:

"Population Genetics of *Neottia bifolia* on Francis Marion University Campus."

Student: Markel McFadden; Faculty Mentors: Dr. Jeremy Rentsch

Neottia bifolia is a species of orchid native to the south eastern United States, the Atlantic coast, and eastern Canada. Also known as the Southern Twayblade, this orchid only grows up to twenty centimeters in height and only produces two, sometimes three, opposite leaves. During this research, we investigated 53 *Neottia bifolia* individuals found across campus for variation in their chloroplast genomes. By extracting DNA samples from orchid leaves, we were able to compare and contrast the nucleic acid sequences of individuals from separate geographic locations. Evidence, through sanger sequencing, showed a single nucleotide polymorphism in the chloroplast locus screened (rps16-trnK). This SNP will be used to infer connectivity between locations on campus. We plan to use this research in order to inform Francis Marion University of the locations of these rare orchids in order to help inform future construction plans on campus.

The Department of Biology at FMU strongly encourages student participation in research activities. We offer many opportunities for undergraduates to assist in faculty research or develop their own independent research projects. Students can earn academic credit through Special Studies (BIOL 497) and Honors Independent Study.

If you are interested in learning more about P.U.R.E. or available research opportunities, please visit our website at: *http://people.fmarion.edu/tbarbeau/PURE_symposium.htm*. You can also contact Dr. Barbeau (tbarbeau@fmarion.edu), the coordinator of P.U.R.E., to answer any questions you might have and get you started on a research project!