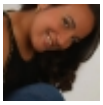
A Summer of Beaches and Biofilms [1]

Submitted by Adriana A Bodlak [2] on 5 August 2016 - 4:00pm

 [2]

Me, my mentor, and my professor at the poster session.

This summer I've had the opportunity to work in Dr. Ríos-Velázquez's laboratory in the biology department here at the University of Puerto Rico- Mayagüez. The soft mater I have been

investigating this summer is a biomaterial called a biofilm.

A biofilm is composed of extracellular polymeric substances such as proteins and polysaccharides. Biofilms are formed by certain microbes and allow them to adhere to each other and to a surface. These biofilm formations allow the bacteria to communicate with each other and act more as a multicellular organism. Bacterial infections in the human body are also capable of forming biofilms. These formations tend to occur on medical devices such as catheters and implants and in people who are immunocompromised. Biofilms in the body are not affected by either the immune system or by antibiotics so they are difficult to eliminate entirely and lead to chronic infections. One idea to mitigate this problem is to dissolve the biofilm so antibiotics and the immune system will have a better chance of eliminating the infection. The goal of this research is to identify existing and novel genes from different sources involved in biofilm production in order to further the development of drugs to break up biofilms in the body.

One type of culture dependent microbe being tested for biofilm production in this study are purple non-sulfur bacteria, PNSB. These bacteria can use different sources of energy depending on their environments, making them very diverse. Considering that they are so diverse, there is a good possibility that they would be capable of forming biofilms. Another, culture independent, option ismetagenomic libraries. They are generated by obtaining all of the genetic information from a sample and splitting it up into viral vectors. These viral vectors are then inserted into bacteriophages which infect *Escherichia coli*, a cultivable bacteria. The infected *E. coli* expresses that genetic information, allowing researchers to test its properties. Considering there are cultivable microbes which only make up 1% of total microflora capable of producing biofilms, then clones from metagenomics libraries which contain the genetic information of the other 99% of microorganisms that cannot be cultured should be able to produce biofilms as well.

In this study we test purple non-sulfur bacteria from microbial mats, water reservoirs, bromeliad phytotelmata, and heliconia phytotelmata and metagenomic libraries from Puerto Rico for biofilm production. The fosmids are extracted from the libraries and then molecular genetic approaches are employed to identify the genes involved in these formations. Individual clones are also isolated from biofilm- positive libraries for molecular genetic testing. The genes tested for are from *Pseudomonas aeruginosa* and *Staphylococcus aureus* which have been shown to form biofilms.

Although my time here in Puerto Rico working on this project is coming to a close, someone else will be continuing my research in the next few semesters and I’m interested to see what new results come out of it. My professor, mentor, and the rest of the lab have been very supportive and welcoming; they made me feel at home. This has been a great experience for me both in and out of the lab, one I will always cherish.
