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Molecular and Microbiology Education and Research: Alternatives to antibiotics

This proposal is for funding for three related microbiology projects and for travel expenses for three students to present their work at a regional American Society of Microbiology meeting. The undergraduates proposing these projects, Suk Namkung, Kayla Fricke, and Carlo Manzana are biology majors that are currently completing their first year of research in the Molecular and Microbiology Education and Research Education group. In this first year they have learned the required lab skills and worked together to develop important questions about methicillin resistant *Staphylococcus aureus*. *S. aureus* is an important pathogen that causes skin and soft-tissue infections as well as life threatening diseases, such as pneumonia. Because many strains of *S. aureus* are multi-drug resistant and cannot always be treated with antibiotics, additional control strategies are desperately needed. The proposed experiments will explore the potential of two alternatives to antibiotics, bacteriophage therapy and blue-light therapy. The preliminary experiments performed by others and in our lab indicate that both of these strategies are feasible, but the mechanisms are not well understood and it is not known how well they will work against various genetic strains of *S. aureus*. Over the past 4 years we have collected almost 500 *S. aureus* samples from the nasal passages of healthy undergraduates and constructed a "library" of frozen samples. The main objectives of these three projects are 1) to determine how many of our library strains are susceptible to bacteriophage infection, 2) how many harbor bacteriophage genomes in their chromosome, and 3) how many of these strains are inhibited or killed by exposure to blue-light. The potential significance of studying bacteriophage and blue light dynamics against a large number of samples is to better understand the variation in response to these alternatives to antibiotics and to explore whether resistance exists or can easily develop. This information is required in order for these strategies to be translated into new therapeutic treatments.