



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY**

Name(s) Charlotte Myers	Project Number J1608
Project Title Identification and Characterization of Novel Potential Antibiotics Targeting Bacterial Motility	
Abstract Objectives The objective of this study is to identify which phytochemical or synergistic combination of phytochemicals of <i>P. granatum</i> is responsible for its motility-inhibiting effects on bacteria in order to facilitate the development of novel antibiotics. Methods I used nutrient agar plates, a culture of <i>E. coli</i> , a microbial incubator, sterile discs, and samples of chemicals found in <i>P. granatum</i> . Used serial dilution to dilute each chemical to the same concentration and prepared mixtures of these solutions to test for synergy. Dipped sterile discs into these solutions, absorbing the same quantity of antibiotic, and placed them into agar plates inoculated with <i>E. coli</i> . Incubated the plates and measured the diameters of the zones of inhibition to determine the effectiveness of the chemicals. Results The results indicated that quercetin, representative of the flavonoid group, best inhibits bacterial growth of the key phytoconstituents of <i>P. granatum</i> . The differences between the zones of inhibition were rather narrow, however, and ferulic acid and the synergy between quercetin, ferulic acid, and ellagic acid were also effective antibacterial agents. Conclusions I determined that flavonoids are likely responsible for the motility-inhibiting impacts of <i>P. granatum</i> . In examining previous studies, this is likely due to an increase in membrane permeability, which affects ATP synthesis and flagellate movement. My experiment will allow the development of novel and efficient antibiotics targeted towards bacterial motility, an often unexplored trait, to help combat increasing antibiotic resistance.	
Summary Statement I identified which phytochemical is the cause of the motility-inhibiting effects of <i>P. granatum</i> on bacteria, facilitating the development of novel antibiotics.	
Help Received I received help from my school's high school chemistry teacher, Dr. Rasmussen, in understanding the chemical aspects of my experiment, including serial dilution and the final antibiotic concentration. He also supervised my experiment to ensure proper procedure and use of the school's incubator.	