



Colorado Science and Engineering Fair

2024 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: The Effects of Potential Antibiotics Against Antibiotic Resistant Bacteria

Finalist's Name: Zechariah Dilley

School and City: South High School, Pueblo

Sponsor's Name: Dr. Amaya Garcia Costas

Category: Micro & Molecular Biology (MCRO)

Division: Senior (9th - 12th grades)

Abstract (250 words or less):

In the U.S. alone, more than 2.8 million antibiotic resistant bacterial infections occur each year, and that number is growing. Ever since our discovery of antibiotics in 1928, bacteria have grown and evolved to be able to withstand coming into contact with antibiotics, therefore becoming antibiotic resistant. This project aims to create a new antibiotic that bacteria have never seen, they will be susceptible because they haven't been able to build up a defense against it. Two natural antimicrobials are copper and glycine. Copper and glycine both stop bacteria by disrupting the cell wall. Amoxicillin stops bacteria the same way.

Bacteria were collected from a local high school, and colonies were isolated and diluted. After dilution and isolation, A Kirby-Bauer Susceptibility test was performed using: penicillin, oxacillin, tetracycline, sulfamethoxazole, and chloramphenicol. After finding bacteria that were resistant to sulfamethoxazole, chloramphenicol, and tetracycline, amoxicillin, copper, and glycine were combined so that there were four mixtures: amoxicillin (control), amoxicillin-glycine, amoxicillin-copper, amoxicillin-glycine-copper. Another Kirby Bauer Susceptibility Test using these mixtures was conducted.

Results from the final Kirby Bauer Susceptibility Test concluded that the amoxicillin-glycine-copper mixture inhibited the most growth compared to the control. This could be because glycine is an amino acid with acidity boosting properties. Copper ions are naturally acidic, therefore by combining them the glycine boosted the acidity of the copper making it more potent as an antimicrobial agent. Future research would include using another antibiotic family, like tetracycline for example, and using different natural antimicrobials.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature: *Zechariah Dilley*

Date: 3-4-24

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.