Antibiotic Resistance's Impact on Me

My freshman year of high school I was challenged to write an argumentative essay on any topic that I wanted. I knew immediately that I wished to write about a science based topic. After extensive research on current scientific events I came across the global problem of antibiotic resistance. I learned that as doctors prescribe more and more antibiotics to combat infections, bacteria gains resistance against the antibiotics to the point where it works very little or not at all. More importantly, I realised that not nearly enough is being done to fight this dilemma. Ever since then I have immersed myself in the world of antibiotic resistance by reading scientific journals, learning about how it affects patients, and researching how this problem can be stopped.

This is not something that can be solved easily, and certainly not something that can be solved through a handful of experiments and tests. This is a problem we all have to work together on. Antibiotic resistance is not something new, it has been around since the discovery of the miracle drug, penicillin. But as technology advances and communities have easier access to medical care, resistance in bacteria grows exponentially. If this problem is not tackled head on now, the use of antibiotics, one of science's greatest discoveries, will become useless.

This summer I conducted an independent research experiment on antibiotic resistance. In this experiment, I used three different antibiotics; Penicillin, Tetracycline, and Ampicillin, and three different species of bacteria; Escherichia coli, Bacillus cereus, and Pseudomonas putida. I had ten petri dishes for each assortment of bacteria and antibiotics. In the span of two weeks I measured the zone of inhibition; the radius of the circle created from the antibiotic where bacteria does not grow. The zones of inhibition grew for each assortment as time passed, but the size of these zones varied from each group. The smaller the zone of inhibition was, the more resistant the bacteria was to the antibiotic. I learned through this experiment that the type of antibiotic used had no effect on the zone size, only the type of bacteria. Thus I concluded that once a species of bacteria becomes resistant to an antibiotic, it typically gains resistance to all antibiotics. This conclusion stresses the urgency of the antibiotic resistance problem and how pressing it is that we, as a community, take action now.

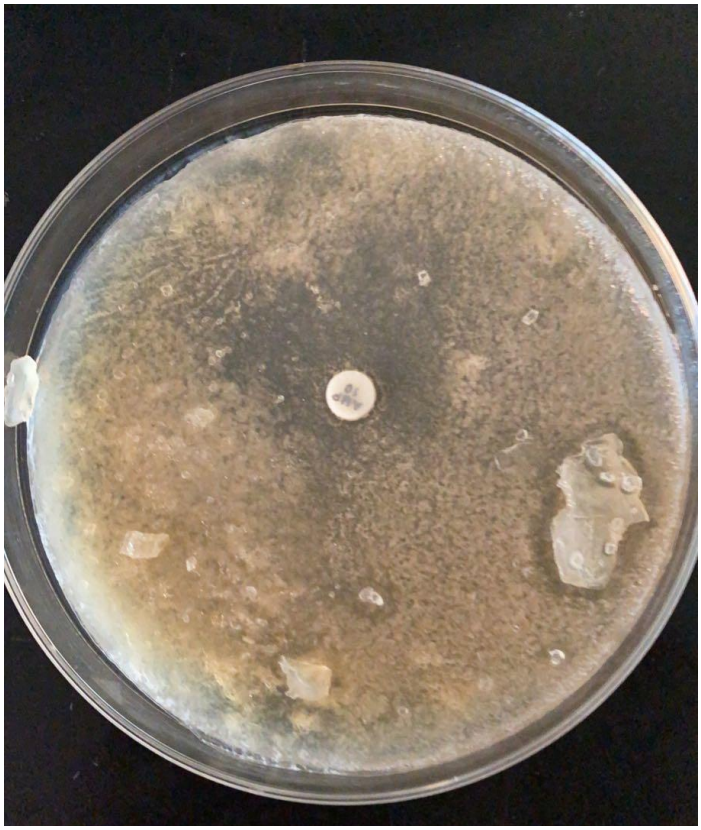
But I wish I could have done more. The biggest problem I faced with this experiment was the cost. I conducted this experiment not to make a groundbreaking discovery, but to gain hands-on knowledge regarding the scientific topic I am most interested in. This project alone has left me hungry for more. I wish to conduct further research and draw more advanced conclusions. But the cost of my fundamental experiment alone was over $200 and to create a more advanced experiment would only mean a larger cost added.

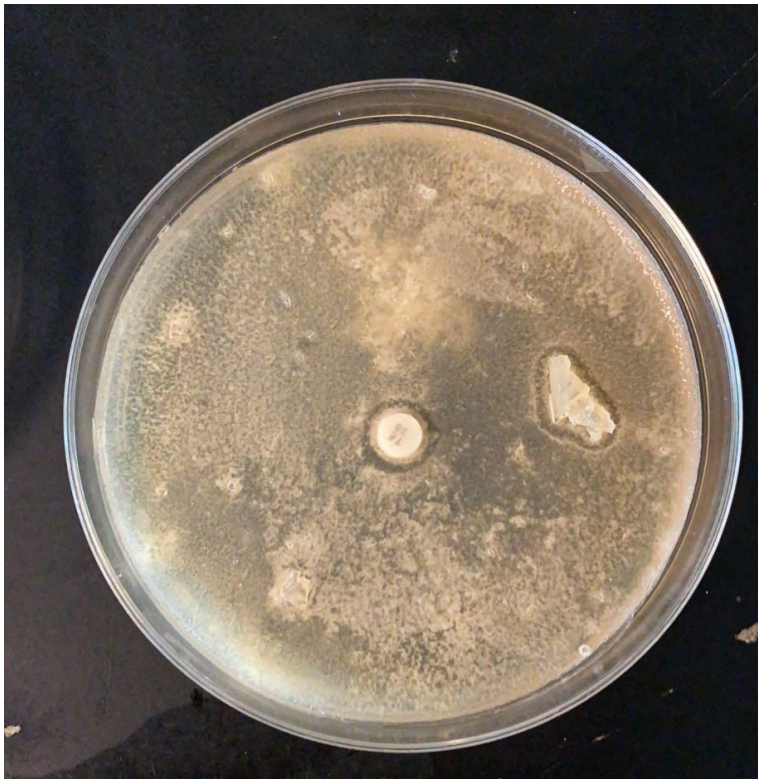
I wish to continue my antibiotic resistance research by using four different species of bacteria and one type of antibiotic. Two of the species would be bacteria that are registered by the CDC as resistant to antibiotics. Two would not have a noteworthy resistance to antibiotics. I would spend the first week of my experiment growing 30 different petri dishes of bacteria for each species. To do this I would spread agar on to each petri dish, then I would use a sterile

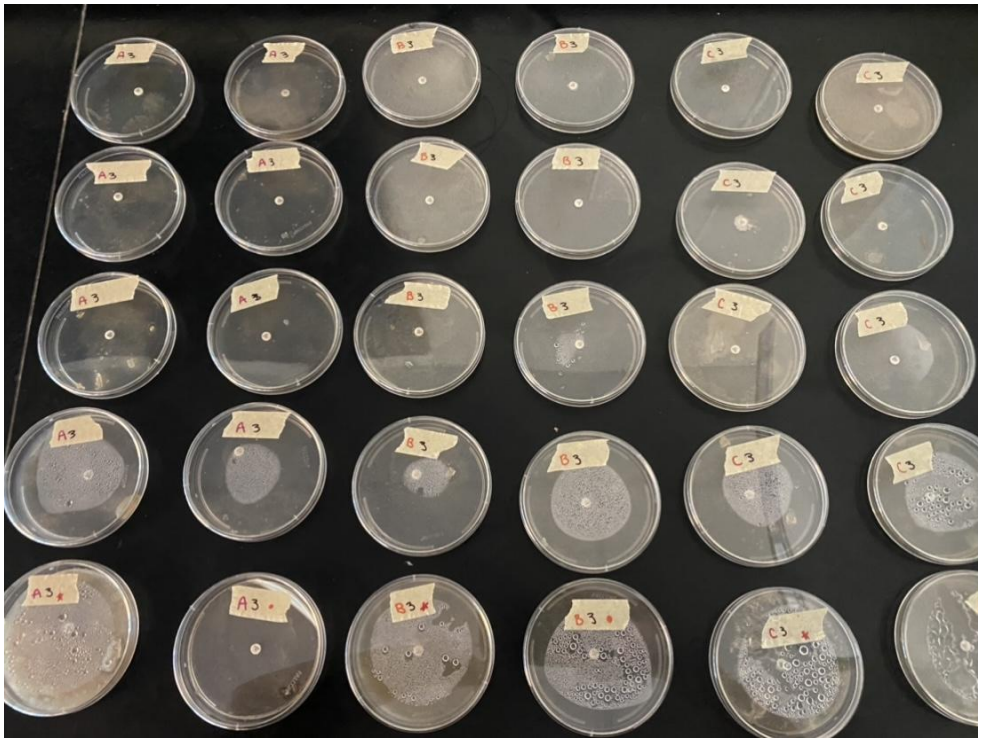
applicator to apply the bacteria on to the agar. In doing so, I would dip the applicator in the tube of bacteria then spread it evenly on the agar, using a new sterile applicator each time. After this week, I would place one antibiotic in the center of each petri dish with forceps that will be wiped before they are used again. I will then measure the zone of inhibition daily for a week. I would change the antibiotic for each petri dish every week. Through this experiment I would learn how quickly bacteria can become resistant to antibiotics. By using the same bacteria every week, the bacteria would adapt to combat the antibiotics over time. I predict that as time goes on, the zone of inhibition measured every week will decrease in size as the bacteria gains resistance.

In order to pursue this project I would need $110.95 for 120 petri dishes. I would also need $24.50 for each species of bacteria and $275.88 for 1,080 antibiotics to be used over nine weeks. Additionally I would need $94.50 for sterile wipes to be used each time I place a new antibiotic on a petri dish and $8 for forceps to place the antibiotics. Finally I would need $190.80 for agar to grow the bacteria on and $33.30 for sterile applicators that will be used to spread the bacteria on to the agar.

As I previously mentioned, antibiotic resistance, one of the world's largest threats, is not something I can solve on my own through a few experiments. It is a problem that can only be solved with the full attention of the community. During my 10 week experiment, I plan to launch a website where I can publicly share my experience on a weekly basis. I also hope to provide the public with resources on my website so the community can stay informed on the threats that come with antibiotic resistance and what we can do to prevent its spread. Through my website, I hope to virtually fundraise for research towards antibiotic resistance that I would donate to *Antibiotic Research UK*, a global charity for antibiotic resistance patient support and research. I truly hope to make a lasting difference with the help of GripTape through this 10 week process. Thank you for your time and consideration.



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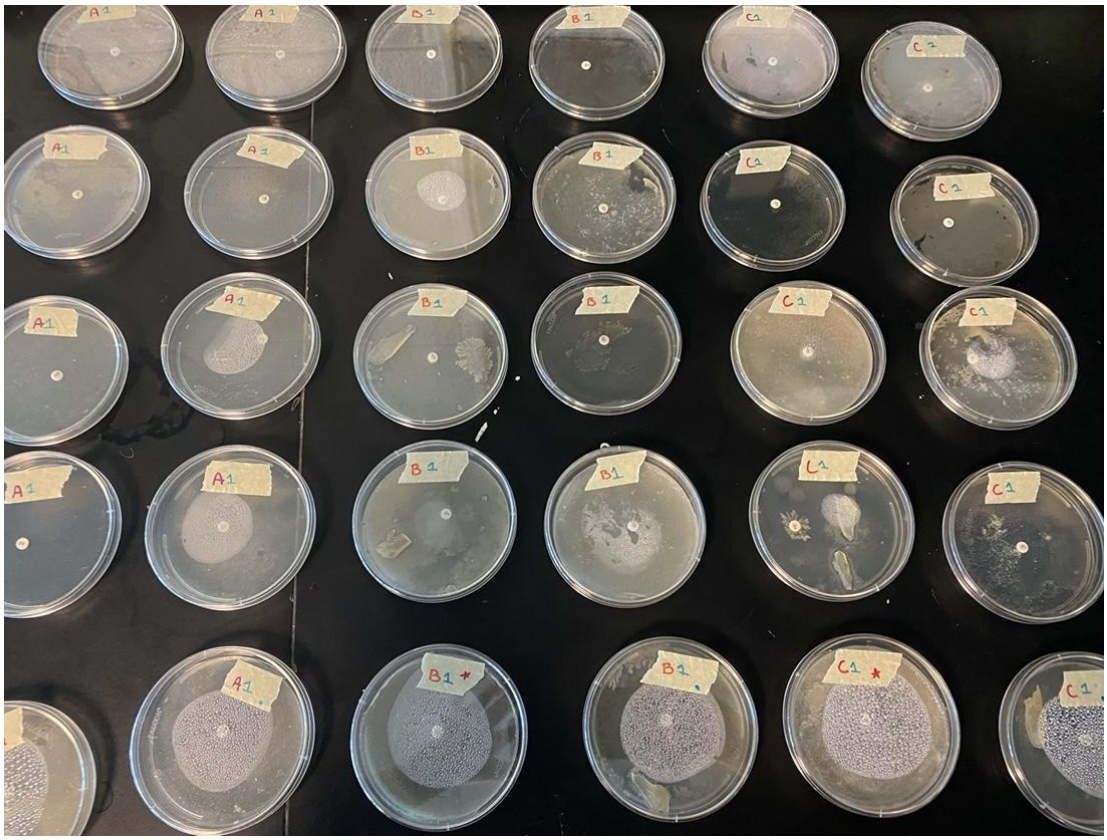
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