# LOGBOOK

November 22, 2024: We started brainstorming Ideas on what topic we should do. First, we established that we were planning on doing an experimental project. After researching and brainstorming, we stumbled upon a few topics we were interested in, such as testing impurities in water, modeling and artificial pancreas, and others. We decided to focus on testing impurities in water for that time, and come back to it later after we had registered for the science fair.

December 11, 2024: On this day, we decided not to do the project of testing water impurities anymore, and change it to something more testable. We also explored some options of psychological topics and also projects involving space exploration. After researching on multiple educational websites and looking at past science fair projects, we decided on our final project: Comparing the Antibacterial Properties of Natural and Commercial Antibiotics

December 19, 2024: Started doing research on places to buy an E.coli strain, our chosen bacteria for the experiment. We found a website that could work for now.

Jan 1, 2025: We made a schedule for how much we were going to work on science fair every week or day, etc. We based it off of what days we have extracurriculars or other things to attend to, and came to the conclusion that we would work on it a minimum of fifteen minutes per day, while working on it more on less busy days, and less on busier days. We also decided on a rough date on when to do the actual experiment. We started to research on what material we need and where to get them, as well as starting to formulate our procedure and variables

Jan 5, 2025: We formulated guiding questions, and started to research among the topics of natural and synthetic antibiotics

Jan 8, 2025: The two of us began making specific plans regarding our experiment. We eventually decided that we would get together near the end of February. We chose this time because it was close to March which is when the actual science fair will take place. This way we have enough time to form our conclusion and findings and still have time for our materials to arrive in time.

Jan 12, 2025: After completing some background research on the topic, we formulated a rough hypothesis, outlining a ground plan of our hypothesis. We also created another tab on our document, with one tab with just all of our research, and the other one for what we were actually going to put on our platform. Today we also started to research garlic and its main antibacterial components.

Jan 18, 2025: Today we researched E.coli and its components. Originally, we were unable to access an important antibiotic, amoxicillin, so we ultimately decided to use neosporin and polysporin, which do not require a prescription unlike amoxicillin. Today we found out that we actually had access to amoxicillin through outside sources, so we changed the synthetic antibiotics we are using to Neosporin and Amoxicillin, instead of Neosporin and Polysporin,

which are very similar and would limit the diversity of our experiment. We also decided to get rid of turmeric as one of the natural antibiotics, as we wanted to have the same amount of natural and commercial antibiotics in order for the best accuracy.

Jan 21, 2025: We continue to research simultaneously during the following steps. We began looking at various websites to search for which product we could buy, such as E.coli or staphylococcus Epidermidis. Our last website did not work because of the price and shipping issues, as the bacteria was not offering shipping to Canada. We encountered another issue, and that was price. Almost every sample of E.coli was more than $100, and cheaper samples had other restrictions. We did find a website that sold the strain for 30-40 dollars, however we still are not certain about shipping and whether the website can be trusted or not. We did not resolve the matter, and are still working on it.

Feb 2, 2025: Began to expand on our research of our synthetic antibiotics.

Tuesday 4: Today we began the research on the steps of peptidoglycan biosynthesis of the bacterial cell, which builds to strengthen the cell wall.

Feb 6, 2025: Today we researched a variety of topics involving continuing the research on peptidoglycan biosynthesis, the components and chemical compounds of amoxicillin, the differences and similarities of natural and commercial antibiotics, and small bits of honey and garlic research. We researched the beginning of the second main step of peptidoglycan biosynthesis, following the first step, which is the formation of UDP-*N*-acetylmuramic acid from UDP-*N*-acetylglucosamine. By digging deep into the research of amoxicillin, we gathered about a paragraph of information today, centering around how amoxicillin works to fight bacteria and its compounds

Feb 13, 2025 : We take a deep dive into how neosporin works and its key components, and how it compares to polysporin

Feb 14, 2025: We found an outside science lab, where we could safely collect our materials and do the experiment. After confirming with the lab and its organizer, we specified a date, time, and location for our experiment.

Feb 26: We go to the University of Calgary to meet up with Dr. Robyn Flynn to talk about the experiment and talk about the concentrations of our antibiotics, along with the equipment and what days to meet up to conduct the experiment. We concluded that the experiment would be a three day process, with the first day making the nutrient agar and letting it set, the second day applying the E.coli bacterial strain and already prepared antibiotics. And the last day going back to the lab to analyze the results and counting the colonies. We also collected some tubes from the lab to put our liquified form of antibiotic, which will be about one milligram of substance each

Mar 3, 2025 : We arrived at the lab to start conducting our experiment. During this process, we pasteurized the honey, diluted our amoxicillin, and plated all our antibiotics using sterile materials. Then we put the plates in a scientific fridge to set.

March 5, 2025: Today was the second day of our lab. During this time, we first conducted an experiment regarding the dilution of the bacteria. After analyzing the results with a dilution of 10, 100 and 1000, we decided based on the results to go between 100 and 1000, at a dilution of 5000. We then plated E.coli on all of the agar plates with different bacteria.

Mar 7, 2025: We go to the lab one last time to print out photos using a specialized machine and see our results. Soon after we began to count the number of colonies residing on each plate. Along with creating our graphs to show the difference in growth for different plates. We also worked on our observations, and then analysis following.

Mar 9, 2025: Today we met up and started assembling our trifold and planning out where to put things and such. We also practiced presenting our script with our peers and ourselves.

March 10, 2025: Today we finished writing our analysis, as well as our conclusion. We made finalizing touches and reviews to our script, analysis, observations, conclusion, application, sources of error, and wrote our acknowledgements.

March 11, 2025: Today we printed out the pictures necessary for our trifold and project in color using the school printer. After cutting them all out, we pasted some onto the trifold and some into a binder, which we could flip through and show the judges as we present. We also made edits to our script, to simplify it and make it so it fits within the 5-10 minute recommended time-line of our presentation, as well as finishing and making final edits to our logbook.

March 12, 2025: Today was the last day before the final science fair. We touched up and finished the trifold, gluing and fixing any parts that looked messy or uneven. We also pasted all of our information into the CYSF website and made finalizing edits. Lastly we practiced and perfected our presenting skills along with making flashcards to aid us with our presentation.