



the stars
challenge

Explore
Biotechnology
Fall 2014



Our voyage around the laboratory allowed us to experience many aspects of biotechnology. It began with the task of familiarizing ourselves with high tech lab equipment. Then, we studied DNA in depth. Reviewing the structure and function of DNA helped us understand it better when we extracted it from fruit and even ourselves! We then investigated the creation of a DNA fingerprint using gel electrophoresis. However, our expedition was just beginning.

We began applying these techniques and technologies to our microbial studies. While learning about viruses, we compared the DNA fingerprints of 3 viral strains. We genetically engineered bacteria to have a trait that it didn't normally contain. After hunting for microbes and exploring the spread of disease, we came up with ideas for our own genetically modified organisms that could somehow help humanity.

Ultimately, our capstone experience combined many of these techniques in an intense laboratory experiment. Samples of food were brought in to determine if any of the ingredients (namely corn or soy) were genetically modified. We completed this by extracting DNA from our samples, amplifying this DNA using a technique called Polymerase Chain Reaction (PCR), and using gel electrophoresis to create DNA fingerprints. These DNA fingerprints were then analyzed in order to determine if any of the DNA came from a genetically modified plant.

Biotechnology has the potential to help us discover new ways to approach problems that have existed for many years. I encourage you to share your knowledge and continue exploring biotechnology since the journey has only just begun.

It has been an absolute pleasure to be able to share my passion for biotechnology with all of you!

Mr. Fusco



Our exploration of biotechnology began with identifying lab equipment that we would be using throughout the course, with a focus and emphasis on the proper use of the micropipette.



From the first night, we immersed ourselves into the science of biotechnology with the help of Georga and Joe.



Upon learning about DNA, we made candy models of the double helix. But it was more exciting to extract DNA from bananas and strawberries.



With some time and patience, nearly everyone extracted some DNA!



Now we were ready to extract our own DNA! Rinse those cheeks to get some cheek cells! The vortex became a popular piece of lab equipment.



Science requires precise skill, which we practiced every week.



Our journey next took us to the land of gel electrophoresis!



Using colored dyes, we learned how molecules can be separated by size and charge.



The next week, we applied this technique into our study of viruses. We compared the DNA fingerprints of 3 different viral strains through gel electrophoresis. A substitute TA, Alex, joined us.



We kept on using that micropipette for nearly every lab!



The next step on this voyage taught us how to work with bacteria! We swabbed various locations and worked with Petri dishes.



We were then able to look at some bacteria under the microscope and see what we cultured. We also explored epidemiology and how diseases spread.



Our epidemiology tracked disease migration using hand shaking. That prompted our next experiment on investigating which method of hand cleaning was better – hand sanitizer or antibacterial soap?



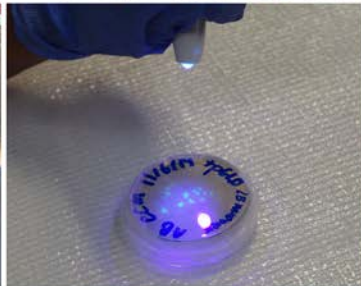
After successfully genetically engineering bacteria, we came up with our own ideas of genetically modified organisms (GMOs) that would help solve a problem.



Our final capstone experiment rolls many of our laboratory techniques into one large experiment. Using foods that we brought in, we are testing to see if any contain genetically modified ingredients!



The first night we extracted DNA and then replicated it in the thermal cycler using PCR. The last class used gel electrophoresis to determine if any of our foods contain GMOs!





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