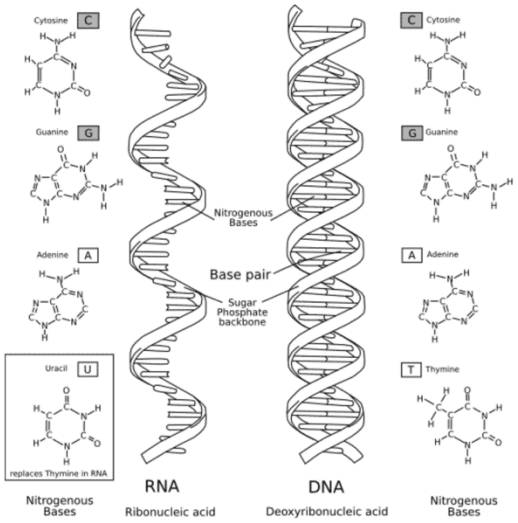
Kaylee Maya
Research - Summer 2021
Dr. Zhang

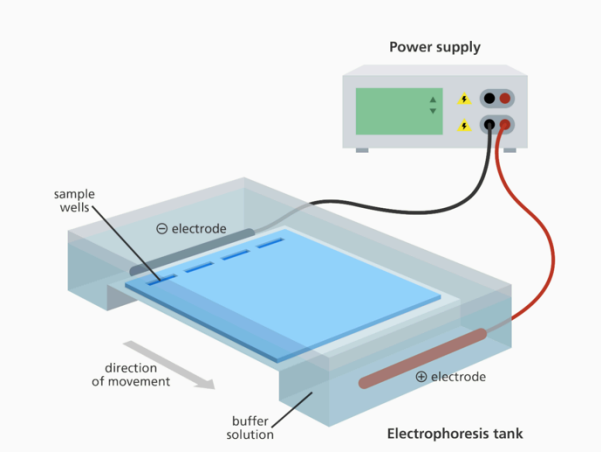
Introduction:



Throughout the summer, I have worked under Qi in Dr. Zhang's lab. Through this she has taught me the basics of the biology end of chemistry. This lab is a water-based lab, meaning that the materials used within the lab aren't very toxic. Within this lab they use special grade chemicals, referred to as molecular biology grade. These solutions as well as the Ultrapure water are extremely important to the experiments run within the lab. Ultrapure water has no minerals within its composition making it suitable for experimentation without there being any form of contamination to the sample. According to Fisher Scientific, molecular biology grade can be defined as solutions "tested for specific contaminants such as nucleases and bacteria where appropriate." Although there are many purity grades, each form of experimentation requires a specific grade for there to be no contamination.

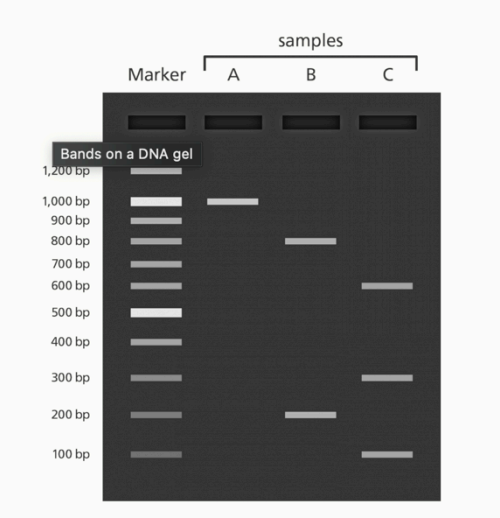
Lab work:

Within the lab we worked with a series of protocols. Some of the protocols were for gels, denature and non-denature gels, as well as buffer solutions. The instruction for the buffers that we used were derived from the lab recipe sheet. One of the most important resources used within this lab is the gels. Although both gels are important and are used and made similarly, they are different. According to AAT Bioquest, denaturing gel is run with the intent to disrupt the natural structure of the DNA/RNA sample. This gel essentially unfolds the structure into a linear chain allowing the sample to be fully analyzed. On the other hand, a non-denaturing gel, also known as a native gel, does not disrupt the natural structure of the sample. The native gel allows for gel separation and analysis of the four levels of the biomolecular structure within the sample. Although Dr. Zhang's lab does use these gels extremely often, gel electrophoresis is also important to many other industries. Although it may seem as though that these gels are not used beyond the lab, there is plenty of articles that support otherwise. For example, according to News Medical, gel electrophoresis can be used to



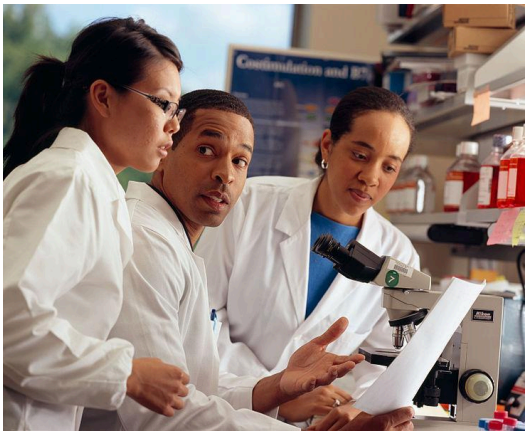
investigate crime scenes, PCR for COVID-19, taxonomy, evolution, the structure and function of proteins, etc.

The process of the gel electrophoresis is as followed. First a gel is created from agarose, agarose is a gelatin like substance that is extracted from seaweed. Once the gel is created, it is then submerged in a buffer solution. The buffer solution is used to control the pH of the experiment. The sample is injected into the wells of the gel, then placed within the tank. With the power supply and electrodes, the gel will then run. After the gel has run, it will be analyzed by its marker. The sample is determined by how far down the sample has moved in relation to the marker. The bands are visible within the gel due to a fluorescent dye that binds to the DNA which is then placed on a UV transilluminator to fully see the DNA bands.



Conclusion:

Overall, within the lab I learned a lot of new material. The material was both hands on and created a new learning experience for me. Most importantly it opened a new door within chemistry for me to be seen. Often times, a lot of the industry is never seen or heard about due to the fact that there are so many branches within every study of science. With the help of research, internships, and course work, I am better able to understand the chemistry industry and what it has to offer and where I would most likely like to work. All in all, research is most definitely important to anyone interested in the science field.



Works Cited:

- **DEMO VIDEO-** https://www.youtube.com/watch?v=8RBs0Ghg_48&t=2s

- https://betastatic.fishersci.com/content/dam/fishersci/en_US/documents/programs/scientific/brochures-and-catalogs/fliers/fisher-scientific-bioreagents-purity-grades-flyer.pdf
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