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Warner Babcock Institute for Green Chemistry

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I have always had an interest in the sciences, but never would I have thought that I would want to someday pursue a career in them. This realization only came after interning for a summer at the Warner Babcock Institute for Green Chemistry. This experience opened me up to a completely new environment and let me experience so much that I would never have experienced elsewhere. Being immersed in the laboratory environment, I recognized my true passion – research.

Our work, Sylvie's and mine, dealt with the chemical bisphenol-A (BPA). Prior to arriving at the lab, we had both been familiar with the chemical, but only on an elementary level. When I arrived at the lab, I felt completely incompetent at speaking and interacting on the same level with the scientists there because I was only a high school student. I thought that this would be the most difficult research I would have to do because I was surrounded by all these bright and innovative minds. But little did I know, the people there were more than friendly and I felt so welcomed. This warm-heartedness really helped me become comfortable with the work place, and I did not feel the least bit embarrassed to ask even a simple question about anything.

On the first day, the director of student affairs, Kate Anderson, took us on a tour of the lab. I was able to get a feel for the place and immediately came to like it. There were so many interesting materials and machines in each lab, and I just wanted to learn about everything. Of course, I knew there were limitations to what I would be allowed to use, or even touch, but I was still eager as ever to learn and listen about all the things going on in the lab.

By the end of the first week, our mentor, John Warner, presented us with a very intriguing project related to can linings. Currently, food cans are lined with the carcinogenic chemical BPA to prevent rusting of the metal. But clearly, this chemical is not the safest. This chemical BPA is an endocrine disruptor that has shown many links to breast cancer. It is found in so many of our household items like plastic food containers, reusable water bottles, food cans, and even in things not found in our house like dental sealants. Our constant exposure to this harmful chemical is very alarming. Many people are unaware that this chemical is even seeping into our bodies, and thus continue to use products that contain BPA.

Green chemistry believes that not only should the outside world use chemicals that are less harmful to the environment and the human body but also that the chemicals used in labs are just as safe. The philosophy is to reduce the amount of toxics created in the lab so that there is even a lesser chance of chemicals like BPA entering our environment. Thus, the Great Neck Breast Cancer Coalition's connection with the Warner Babcock Institute for Green Chemistry is only logical. The coalition focuses its efforts on preventing breast cancer unlike most organizations that focus on a cure. Green chemistry is the same in its method of thinking – eliminate toxic waste in the lab so that there is no possibility of toxic waste in the environment.

Our project was to study different polymers that could be coated onto metals to prevent corrosion just as BPA does. These polymers would be safer than BPA and thus reduce people's exposure to carcinogens in their foods. To begin this project, John suggested that we first do some preliminary testing with cans. Following his suggestion, Sylvie and I went to the store and purchased several cans, some which were BPA-free and others which used BPA in their can linings. We emptied these cans and filled them with water. After leaving them out for 24 hours, we came back to varied results. Some of the BPA-coated cans were rusting, although the purpose

of the presence of BPA is to protect against corrosion. We were so utterly confused by the results and we submerged ourselves into intense research to find the answer to our problem. What we found was that the peach cans, which corroded the most, did so because peaches had the lowest pH out of all the foods in the cans.

From prior research, Sylvie and I knew that the metal zinc was the most susceptible to corrosion by natural acids, such as malic and citric, found in canned foods. Using this research, we decided to use zinc as the test metal, acting as the metal in food cans. With John's help, we picked out four different polymers (PAA, PVP, PMMA, PVC) to coat the metal with. After much tedious work, we had finally coated over 200 test zinc screws with our different polymers. The polymers were varied in percent weight (1%, 3%, 6%) and drying method (cured at 210°C or air dried). After completing the coatings, we submerged each of the different test metals in a variety of solutions: two different acids, one base, plain salt, the base mixed with salt, and one acid mixed with salt. We then asked scientists in the building to judge these metals for corrosion on a scale of one to five. We provided a basis on comparison with pictures we judged were appropriate for each score. The scientists, after approximately a grueling hour of examination, then submitted these scores to us. This process went on for a week, and after which, we compiled the data together for analysis.

The objective of this project was to figure out if the structures of the polymers had any correlation to their ability to prevent corrosion. John suggested that we look at the atomic distances between the zinc atoms and the polymer's atoms. With the help of Ben, a scientist at Warner Babcock, I was able to use a program called ChemDraw to digitally measure these distances through approximate calculations done by the program.

All in all, this experience at Warner Babcock allowed me an opportunity to formulate my own experiment as well as carry it through in a real laboratory. The equipment there allowed me to do so much more than possible in a school setting. The people there were so interested and passionate in their work. As I always tell people when they ask me about my time at the lab, I would love one day to work in an environment like the one at Warner Babcock. I would want to surround myself with innovative work as well as provocative, intelligent and passionate people. Had it not been for this internship, I would never have realized these aspirations. This summer has given me so much to think about, from future research to a future career. I owe so much to the people at Warner Babcock who were so gracious to take time out of their busy schedules to teach and explain even the most rudimentary things. In addition, without the connections of the Great Neck Breast Cancer Coalition, I would never have received an opportunity like this one. I hope one day to inspire people to pursue their interests as the scientists just as the people I've met this summer have inspired me. The internship at Warner Babcock was an extraordinary and once-in-a-lifetime experience.