

Special Thanks To:

Research Review Board

Mrs. Kausch, Mrs. Kehn, Ms. Lanoue,

Mrs. Maureen Gifford – Mayer,

Mr. Pagano

and

Ms. Long, the High School Librarian

Mr. Papandrea, Jr/Sr High School Principal

Mr. Apostol, Superintendent

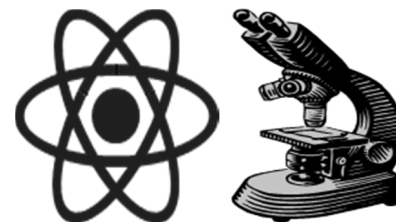
Finally

Parents and Families,

who gave time to the preparation and
success of the symposium and their
continued support of the projects.

Francis “Bucky” Thompson
25th Annual
Student Science Research
Symposium
Thursday May 28th, 2020

Hoosic Valley



Research Program



Schedule



- ⊗ **Opening Remarks** **7:00**
Mr. O'Brien
Research Program Director

- ⊗ **Presentations** **7:10**
James Czub
Logan Seymour
Christopher Smith

- ⊗ **Poster Presentations** **7:50**
Madison Clum
Emily Jacques
Thomas Rice
Eva Robert
Katherine Rose
Amanda Salisbury

- ⊗ **Final Remarks and Awards** **8:10**
Mr. O'Brien



Notes

The Student Science Research Program

Student Science Research is a 3-year college credit course associated with UAlbany through its University in the High School Program. Over the course of the 3 years students learn college level skills including presentation techniques, scientific writing, organization, and time management while completing research on a topic of their own choosing.

Students are expected to do a thorough Review of the Literature, develop a problem and/or hypothesis, and with the help of a professional with the expertise in that field, develop an appropriate methodology for testing their hypothesis. Once they have gained approval by the Research Review Board, student researchers carry out the experiment, collect and analyze data, and draw conclusions.

Once their work is complete students are encouraged to submit their work for publication in an appropriate journal or to a competition such as the Junior Science and Humanities Symposium.

Each year the students must present their finished work or work to date as a PowerPoint and/or a poster before the general public. Which brings us to our 25th annual presentation of student research at Hoosic Valley.

Microplastics in Marine Environments

As I've narrowed my focus of research this year, I've immersed myself into learning all about microplastics. These plastics are typically defined as less than 5mm in diameter, and can either result from the process of macro plastics breaking down due to UV exposure, wind, waves, and other factors, or be the directly manufactured to be microscopic for several industrial purposes such as packaging, heavy duty cleaners, and even PPC (personal care products) Microplastics have increasingly become a threat to many different organisms, including humans, as they have the potential for bioaccumulation up the food chain, and carry harmful chemical residues. This summer, I plan to collect samples from various locations along the Hudson River in order to help quantify the number of microplastics in our area. Quantifying microplastics is the first step in helping scientists better understand how to lessen plastic litter and prevent these small, but lethal plastics from entering our water.

Acknowledgements

I would like to thank my teacher, Mr. O'Brien for guiding me through this program, our librarian, Ms. Long, for helping me find articles to aid my learning, the researchers at the Hudson River Park Estuary Lab for corresponding with me and giving me guidance, and my friends and family for supporting me.

Christopher Smith

Effects of Vitamin D on Mammary Tumor Growth

When considering the growth and development of cells, several factors are at play. Countless growth factors, hormones, proteins, and more affect the organogenesis of any bodily structures, as well as how they function after they have been developed. Vitamin D has been shown to have a large effect on cancer development in the salivary glands, with murine models showing that a lack of Vitamin D receptors leading to dysplasia. These models also showed that Vitamin D receptor activation triggered cell cycle exit and differentiation in salivary glands. Cell cycle exit and differentiation are often coupled processes, and are positive because they reduce the chance of blastoma formation, and therefore cancer as well. As a result of this research, attention has turned to the effect of Vitamin D on mammary glands, and, subsequently, breast cancer. It is believed that results similar to those found in the salivary glands will be found in the mammary glands, leading to my hypothesis that Vitamin D deficiency leads to more aggressive mammary tumor growth

Acknowledgments

I would like to thank my research advisor Dr. Kara DeSantis, my teacher Mr. O'Brien, the Research Review Board, my fellow science research classmates, and friends and family who provided me with support along the way.

James Czub

Effects of a Nitrogen Strip on a Field

Agriculture has been and will continue to be a major industry in the United States. Agriculture is also a major contributor to environmental hazards like algal blooms and pesticide runoff. Precision agriculture solves problems like this by implementing modern day technology into older methods. The use of modern technology involves finding the highest yield of the plant and obtaining it in a way that it doesn't harm the environment yet is cost effective for farmers. My experimental design involves finding the low -yielding areas of the field and laying a nitrogen strip across it. The nitrogen strip will be the only nitrogen based fertilizer on the field. This will help eliminate wasting of nitrogen and minimize environmental impact..

Acknowledgements

I would like to thank the following people and organizations for supporting and assisting in my Science Research Project; Dr. Quirine Ketterings and her NSMP team, my family, fellow Science Research classmates, Mr. O'Brien and the Rensselaer County 4H program. They have inspired my interest and provided a great deal of support through my time in the program.

Emily Jacques

The Emotional State of Female Criminal Offenders

My current research topic is the analysis of the emotions female criminal offenders feel while they commit their crime(s). In many cases, women offenders were mentally and/or physically abused at some point in their life making them feel powerless and have low self-esteem. In most research, their emotions can be categorized into four basic emotions: anger, depression, elation, and calm. Female criminal offenders are often overlooked in the criminal justice system and therefore little research exists regarding their emotional state. As I continue with my research I hope to see a calm emotion linked with similar crimes in order to help improve the rehabilitation of those offenders.

Acknowledgments

I would like to thank Mr. O'Brien, Ms. Long, my parents, and my classmates in the Science Research program

Logan Seymour

Super-Enhancer associated lnc-RNAs in Early Stage Breast Cancer

As early screening of breast cancer is on the rise, so is the need for better understanding of the progression of non-invasive to invasive breast cancer to help doctors correctly diagnose patients. Ductal carcinoma in situ (DCIS) lesions are direct precursors of invasive ductal carcinoma (IDC) however not all DCIS lesions develop into metastatic disease. Thus, there is a critical need to identify determinants of progression of DCIS to IDC to allow discrimination between harmful and harmless breast cancers. Super enhancers are regulatory regions of DNA that play critical roles in driving expression of genes that define cell fate decisions and importantly, their normal function can be diverted during the development of tumors. Long noncoding RNAs (lncRNAs) are non-protein coding RNAs that can be associated with enhancer regions, and interact with enhancer sequences to influence activities of neighboring genes. There are specific super enhancer associated lncRNAs that have been identified in breast cancer progression that may be able to shed light on how DCIS lesions become cancerous.

Acknowledgements

I would like to thank my family, friends, and the members of the science research program. I would also like to thank Mr. O'Brien, and my research advisors Rebecca DeVaux and Ali Ropri.

Amanda Salisbury

Using Mycelium for Compostable Packaging

My current research topic is mycelium packaging. Mycelium packaging is a biodegradable eco-friendly alternative to polystyrene packaging. This is an extremely important topic because polystyrene is not biodegradable and has adverse effects on the environment. No known organism can degrade polystyrene unlike mycelium which completely degrades in about 90 days. Mycelium packaging doesn't cost more than making styrofoam. Major companies like Dell and Steelcase use this packaging. Ecovative Designs focus on producing mycelium packaging, plant based meat, and so much more. Eben Bayer is the man who founded Ecovative Designs and his plan is to replace polystyrene with mushrooms. In the future I hope to do some research at Ecovative and possibly develop a small research question. This research question I would like to answer by doing independent research with the help of my mentor.

Acknowledgments

I would like to thank Mr. O'Brien, Melissa Kalbfliesh from Ecovative Designs, my family, and friends for their extraordinary support and guidance through this program.

Thomas Rice

Supplementation Patterns and the Knowledge of Supplementing in Sports

My current topic of research is supplement use patterns within athletes and the knowledge they have on these supplements. A supplement can come in many forms including pills, powders, and much more. Supplements can enhance muscle growth, increase energy, and much more. These athletes use the supplements in order to increase their athletic ability. Supplements work together to provide your body with the necessary foundation that is needed to build muscle tissue quicker and more effectively. It has been shown that athletes have a poor understanding of these enhancements and the possible negative side effects that come with them.

Acknowledgements

I would like to thank Mr. O'Brien, my parents and family, and my fellow Science Research classmates.

Eva Robert

Nanotechnology in Cancer Research

My current research topic is nanotechnology in cancer research. Nanotechnology is becoming increasingly important in the field of cancer research and treatment. Nanoparticles, typically measuring between 1 and 100 nanometers (nm) in diameter, have unique properties which can be readily manipulated for a desired application or effect. Researchers in the field of nanotechnology hope to apply these properties to materials, biologic structures, and devices at molecular levels. Safe drug delivery is a major challenge in cancer treatment. Nanotechnology has shown promise for a more effective drug distribution and a more efficient drug delivery system. This means that scientists can get the drug or treatment specifically to the cancer site without affecting the patient's healthy cells. Nanotechnology may also be a useful tool for monitoring treatment effects on tumor growth/regression.

Acknowledgements

I would like to thank my teacher, Mr. O'Brien, my fellow classmates, my friends, and my family for all their support and help throughout this program.

Katherine Rose

Climate Change Impacts on Microplastic Pollution

The topic of my research is how microplastics and climate change correlate. Microplastic pollution is harmful on its own but climate change can worsen its effects. Microplastics get dumped in waterways or washed in from storm drains. They get caught in the gills of fish, cause alterations in reproduction and kill many small organisms. Exposure to UV rays from the sun and heat cause microplastic particles to become brittle and break into smaller pieces. As climate change worsens, microplastics may cause additional stress to living things in our environment. For my research I would like to work with my future mentor on collecting samples from local waterways to find the concentration of microplastics and study how different factors such as climate change affect the data.

Acknowledgements

I would like to thank Mr. O'Brien, Mr. Spooner and my parents.