BROTHER AUBERT HARRIGAN C.S.C.

Science Research Program 2023



HOLY CROSS HIGH SCHOOL 26-20 FRANCIS LEWIS BOULEVARD FLUSHING, NEW YORK 11358

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This Evening's Events

Student Poster Board Presentations

Welcome Mrs. Cathy Kenny, MPH

Science Department Chair & Science Research Coordinator

Opening Prayer

Dinner

Presentations

Closing Remarks

SCIENCE RESEARCH PROGRAM



Mrs. Cathy Kenny, MPH Science Department Chair & Science Research Coordinator

The Science Research Program at Holy Cross High School was started in the fall of 2006 with a class of four sophomore students and the help and support of Mr. James Harden, Class of 1969.

Science Research in the High School is a college course that is affiliated with the State University at Albany. During the three years that the student is involved in the program, they will be researching a topic of their choice with an outside mentor at a science related institution. This institution could be a hospital, laboratory or university campus. The student, under the guidance of their mentor, designs a science research project that they will work on throughout the three years of the course. The end goal of the program is to be able to enter the student's project into one of the national science research competitions or to have a research paper published.

Throughout the years, our students have researched topics such as cancer, heart disease, gene sequencing in kidney disorders, ballistics, and music therapy just to name a few. They have worked at Memorial Sloan-Kettering Cancer Center, Mt. Sinai Hospital, Lenox Hill Hospital, Columbia University, Manhattan College, Columbia Medical Center, New York Institute of Technology, and St. Francis Heart Hospital. Our alumni have attended St. Edward's University, Siena College, the University of North Carolina, Fairleigh Dickinson College, St. John's University, New York University, Fordham University, Rensselaer Polytechnic Institute, The College of Mt. Saint Vincent, The Merchant Marine Academy, and Brown University. Holy Cross High School is very proud of all that our students have accomplished over the years! One of the great features of our program is the extent to which our students work together as a community. As our seniors move on to new and exciting challenges, I wish them much success and happiness. I hope that their experiences in the Holy Cross High School Research Program will serve them well in their future studies and careers and that they will look back fondly on the time that they spent in our program!

SCIENCE RESEARCH PROGRAM ADVISOR



Dr. Anthony Paratore Program Advisor



Dr. Anthony Paratore, PhD, graduated from Holy Cross in 2000. He received his Bachelor of Science in Biology from St. Francis College (2003), Master's in Molecular-Cellular Biology from Long Island University (2006) and Doctorate in Biology from St. John's University (2015).



Dr. Paratore served on the Holy Cross Board of Directors from 2008-2014 and has been advisor to the Science Research Program since 2013. Currently, Dr. Paratore holds multiple faculty appointments: adjunct professor at NYU's Tandon School of Engineering, adjunct assistant professor at CUNY, St. John's University and Long Island University (Brooklyn). He teaches classes in biological and natural sciences ranging from entry-level biology for non-science majors to graduate level courses on the evolution of consciousness. Dr. Paratore is also the founder and Chief Executive Officer of Sapience Associates. He resides in Long Island City with his wife, Ornela, a physician and their two children, Adriana and Tony.



CLASS OF 2023 ANDREW FAZIO



Student Perspectives on Having an LGBT Child

Lesbian, gay, bisexual, and transgender (LGBT) youth are at a disproportionately higher risk of depression, anxiety, and suicide. Parents may respond to their child's identity with shame and rejection. These responses can worsen LGBT adolescents' psychological maladjustment. To raise awareness and reduce the stigma surrounding LGBT youth, I will survey students at Saint John's University about their attitudes toward having a gay, lesbian or transgender child. A Google Form will be emailed to the student body. All responses will be anonymous. Questions will consist of statements (e.g., "I would find it highly problematic if my son came out as gay") that participants respond to via a Likert Scale. Multivariable analyses will examine group bias toward a specific

sexual orientation or gender identity. Linear regression models will determine how gender and age impact acceptance of having an LGBT child. I hypothesize a negative relationship between age/religiosity and acceptance. Women will likely be more accepting than men. I also hypothesize that gay and lesbian children will be more accepted than their transgender counterparts.





CLASS OF 2023 EDWARD HARNETT

Type 1 Diabetes

The research that I will be conducting for my final year in the Science Research Program will be focused on how to live a healthy life while also being diagnosed with Type 1 Diabetes. The name of my mentor is Audrey Koltun, a dietitian that works in Northwell Health. Type 1 Diabetes, also given the name Juvenile Diabetes, is a disease which affects the pancreas due to a lack of insulin production. Type 1 Diabetes affects the pancreas of all diabetics in unique ways. In my research, I will analyze how insulin affects one's blood sugar levels. I will also be determining if taking more insulin causes the blood sugar levels to increase or to decrease. Finally, I will come to a conclusion about how influential insulin is on the body of an individual with Type 1 Diabetes and how much one's blood sugar levels will change depending on the amount of insulin present in the bloodstream.





CLASS OF 2023 ALEXIS WIRTA



Platelet Rich Plasma

Under the mentorship of Marios G. Haritos, Doctor of Physical Therapy, I have continued working on the effects of platelet rich plasma. The beginning of my project started with researching scholarly articles and meta-analyses conducted by medical professionals. Last year, I conducted a blind study on three of Doctor Haritos' patients who received PRP treatment for a shoulder injury. This year, Dr.Haritos and I have decided to expand on the patient data and study patients who have received PRP treatment for neck, knee and hip injuries. Using the data found from last year's research, we will compare the effects of plasma on different injuries.



CLASS OF 2024 AAMIR KHAN

The Risk Assessment of Pesticide Ingestion with Fruit and Vegetables for Consumer's Health

Around the world, the dependency on pesticides is increasing. Every agriculturally produced good today contains many pesticides. If unregulated, the amount of pesticide that farmers apply on crops can surpass the lethal limit causing extensive damage to consumers and the environment. Although the introduction of pesticides in the agricultural world was meant to reduce health risks, research now shows that some pesticides can make crops more hazardous than crops exposed to pests. For the well-being of the citizens and the particular environment of their countries, governments regulate the use of pesticides. As technology advances, more countries look to start using GMOs (Genetically Modified Organisms) as a safer alternative to pesticides.





CLASS OF 2024 GEORGIA TENTOMAS



The Effect of Sunspots on the Earth's Climate:

The objective of this study is to observe and analyze historical data of active sunspots in order to better understand their development and their impacts on the Earth's environment. Sunspots are part of an 11 year solar cycle and reach stages of solar minima and solar maxima, in which there are either a small number of sunspots or a large surplus of them, respectively. The solar cycle is when the sun's magnetic field flips, occurring every 11 years, resulting in the south pole becoming the north pole and vice versa. Sunspots play a role in this cycle since they are formed whenever there are significant disturbances in the sun's magnetic field, such as the reversal of the poles. These sunspots are active regions composed of complex magnetic fields, which tend to be much stronger towards the middle of the sunspot. The dark center of the sunspot is the umbra, containing the strongest magnetic fields,

while the lighter area surrounding it is the penumbra and consists of weaker fields. Sunspots often appear in pairs of opposite polarity, which are connected by magnetic field lines. When these lines become entangled, the magnetic disturbance contributes to the creation of sudden bursts of energy called solar flares. Therefore, as sunspot numbers increase, the number of solar flares increase as well, in turn influencing geomagnetic storm activity. These storms can interfere with satellite communication, and affect the efficiency of the power grid. In addition, more sunspots deliver more energy and ultraviolet radiation to the Earth, which also has a significant impact. This increase in solar energy is believed to heat both terrestrial and marine regions, influencing patterns of precipitation and groundwater. I will be continuing this research on the evolution of sunspots and their impacts under the mentorship of Antonios E. Marsellos, affiliated with the Department of Geology, Environment and Sustainability at Hofstra University.



CLASS OF 2025 GABRIEL ANDRADE

Stem Cell Therapy on the Heart

Throughout the search for a permanent regenerative medicine for cardiovascular issues, one of the most promising has been stem cell therapy. The reason that stem cells are so promising is their versatility as well as their effects on the heart. It has been shown that stem cells simulate the effect of reversing the effects of someone's heart disease and the stem cells might also improve the heart's function. This might not be the case for everyone and the stem cells might just slow down the effects of heart disease. Even though stem cells are a great treatment for various types of cardiovascular diseases it all comes down to the type of stem cells. There are different types of stem cells and each comes with different types of benefits. With stem cells being so promising, there are some drawbacks. One problem is the storage and delivery of stem cells to the heart. Even with something that seems straightforward it can lead to many problems such as the



stem cells dying and leading to the patient getting a lower amount of what they should be receiving. This problem is caused both by the delivery method and the storage of the stem cells. There have been some ways to fix this problem but no permanent solution yet. With all of that in mind I have decided to do my research on the effectiveness and usefulness of stem cells in cardiovascular disease.



CLASS OF 2025 KEVIN HARNETT



Physical Therapy Muscle Injury Recovery

I will be conducting my research on physical therapy recovery and why it is the best type of recovery for muscular injuries. I chose this topic to research because I have had many muscular injuries. For me, physical therapy was the best way to recover. Physical therapy is the treatment of disease, injury, or deformity by physical methods such as massage, heat treatment, and exercise rather than by drugs or surgery. It ensures that you are working an injured muscle in a safe way and allows the muscle to become stronger. I'll be focusing on lower limb recovery such as hamstring, quads, and knees because these are all injuries I have experienced. In my research, I will compare people with similar injuries in the lower limbs, but analyze different recovery methods. One method will be through physical therapy, while the other will focus on the

use of various drugs. I will analyze the recovery length and other factors to see what would be the best recovery route.



CLASS OF 2025 HANNAH MAHER

How Consuming Contaminated Fish and Shellfish Effects Our Bodies

Toxins found in consumer fish and shellfish such as mercury, PCB's, dioxins, and chlorinated pesticides lead to food poisoning and harmful long-term impacts on the body such as paralysis and neurological impacts of the brain's function. To further expand my knowledge on how toxins enter shellfish/fish bodies, I will continue researching and summarizing journal articles to determine what steps society can take to prevent these toxins from entering sea life bodies in terms of how we protect our environment, and how shellfish/fish can be more accurately tested in food labs for toxins. Fish/shellfish in freshwater environments are contaminated with industrial metals such as mercury and arsenic, and biological toxins such as PCB's and histamines which could essentially lead to shellfish poisoning. I will be determining how detrimental these long-term effects are from industrial metals and biological contaminants.



I hope to collect samples this year of freshwater shellfish/fish which are contaminated and ones that are not to determine a ratio of which fish contain mercury and which do not contain mercury. I will be able to determine overall whether the freshwater source is contaminated with high levels of mercury. I hypothesize that there will be high levels of mercury in New York City freshwater due to the plethora of industrial waste and pollution that is found in the water and atmosphere.



CLASS OF 2025 JASON PAZ



Interventional Cardiology

My research is about the advancements of Interventional Cardiology. This is done by analyzing past, current, and possible future solutions that can be used to resolve heart issues without invasive procedures. Risks are analyzed by checking that the materials used (examples: stents and catheters) will be safe and effective, by making sure no extra risk is being taken on, and that the catheter is following a safe route to where it needs to be. According to the Center of Disease Control (CDC), more than 20 million people struggle with coronary artery disease. This does not include the millions more that suffer from other heart diseases. In order to treat all of these people with safe, effective, and non-invasive procedures there are many technological developments that are needed and have been made to give patients less invasive procedures.



In Memoriam Brother Aubert Harrigan, C.S.C.



BROTHER AUBERT HARRIGAN, C.S.C. PRINCIPAL 1967-70 • DIRECTOR STUDIES 1963-67 ENDOWMENT FOR SCIENCE RESEARCH ESTABLISHED 2006 BY JAMES HARDEN '69

Brother Aubert Harrigan, C.S.C. pursued his higher education at the University of Notre Dame from which he was awarded a Bachelor of Arts degree in June, 1950. He did graduate studies at Fordham University, Bronx, N.Y. and at the Toronto School of Theology in Toronto, Canada. He received his Master's in Religious Education from the Toronto school in 1982. Brother Aubert's early years were spent in the apostolate of education in various schools conducted by the Brothers of Holy Cross in the United States. He held teaching and administrative positions in schools in New York, Ohio, Connecticut, and Rhode Island. From 1967 to 1970, he was the principal of Holy Cross High School in Flushing, New York. He also served as member of the Provincial Council of the Eastern Province of Holy Cross Brothers. Brother Aubert moved to St. Joseph Center in 1983 as director of development. From 1985 to his retirement in 1993, he was the administrator of St. Joseph's.

Brother Aubert Harrigan, C.S.C., passed way October 18, 2006 at St. Joseph Center, Valatie. He was 79 years old.

Holy Cross High School

26-20 Francis Lewis Blvd. Flushing, NY 11358 **Phone:** 718.886.7250 **Fax:** 718.886.7257 **E-mail: info@holycrosshs.org**



The Science Research Program, taken in addition to another scheduled science course, is a threeyear program designed to present to qualified students the opportunity to perform independent scientific research under the direct supervision of a mentor from a university or hospital. Students in this program may pursue college credit from the SUNY system through the University at Albany.



Holy Cross High School • 26-20 Francis Lewis Boulevard • Flushing, New York 11358 Tel: 718-886-7250 • Fax: 718-886-7257 www.holycrosshs.org

@holycrosshsny

