

BROTHER AUBERT HARRIGAN C.S.C.

Science Research Program 2022



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



This Evening's Events

Welcome

Mrs. Cathy Kenny, MPH

*Science Department Chair &
Science Research Coordinator*

Opening Prayer

Dinner

Presentations

Closing Remarks

** Poster Presentations can be found on our website.*

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, Sienna College, the University of North Carolina, Fairleigh Dickenson 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 graduated from Holy Cross in 2000. He received his Bachelor of Science in Biology from St. Francis College in 2003 and his Master's Degree in Molecular-Cellular Biology from Long Island University in 2006.

In May 2015, he received his Doctorate in Biology from St. John's University. Dr. Paratore was on the Holy Cross Board of Directors from 2008-2014 and has been advisor to the Science Research Program since 2013. Currently, he is an Adjunct Assistant Professor at New York University Tandon School of Engineering, St. John's University, and CUNY.

Dr. Paratore lives in Long Island City with his wife, Ornella, daughter, Adriana and son, Tony.



CLASS OF 2022

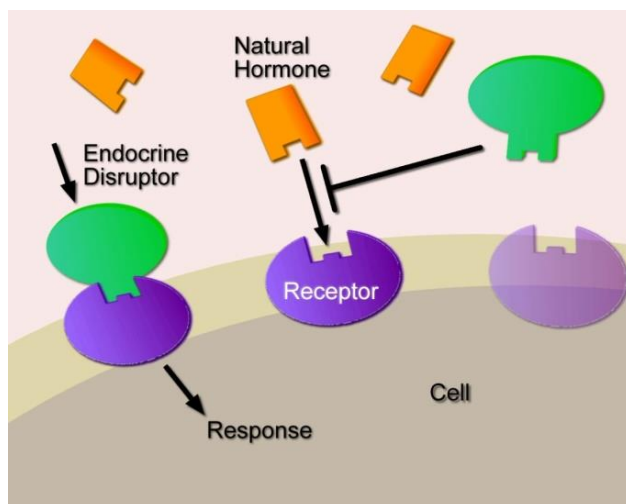
GABRIELLA AORDKIAN



Endocrine Disruptors

Endocrine-disrupting chemicals (EDCs) are synthetic hormones that are often located in everyday items. The body is more sensitive to these chemicals in utero, pre-puberty, puberty and pregnancy because that is when it is undergoing a physical change. The body cannot distinguish between a synthetic hormone or the actual hormone because they both have similar chemical composition. Many times it binds with the synthetic hormone which in turn produces a different response than with the actual hormone. These alternative responses produced can help catalyze a complex disease in the future, such as breast cancer. For the past two years, I have had the privilege of being under the mentorship of Laura Weinberg, an advocate for endocrine-disrupting chemicals at the Great Neck Breast Cancer Coalition.

She has given me incredible opportunities to explore the dangers of these chemicals, including a summer internship with Dr. Laura Vandenberg of UMass Amherst last summer. Under this internship, I had the opportunity to meet major breast cancer advocates who want these dangerous chemicals to be regulated. This is what moved me to shift my focus towards the advocacy side of endocrine disrupting chemicals. My research will consist of a review of what endocrine-disrupting chemicals are and how people can help reduce their own risk and their community's risk of disease from these endocrine disrupting chemicals.

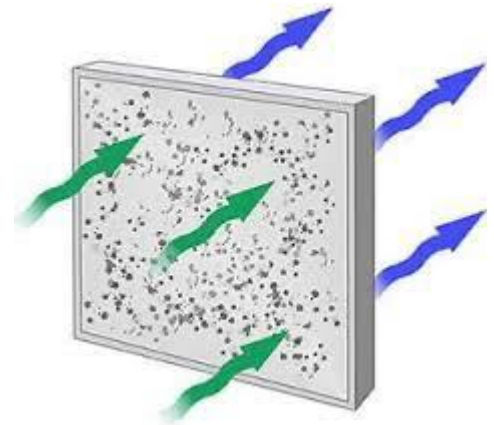
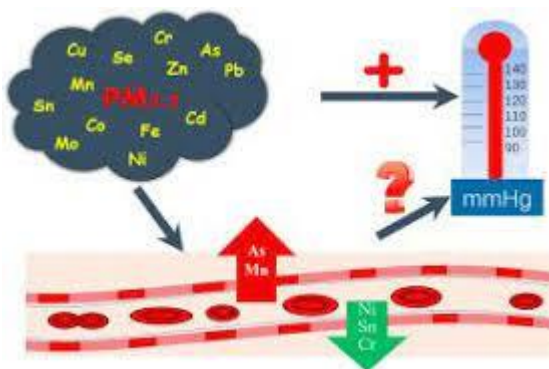


CLASS OF 2022

IRENE MAVROMICHALIS

Effect of Air Pollution on Hypertension

Throughout my years in the Science Research Program, I have been researching the risk factors and protective actions against Metabolic Syndrome. This year I will be researching with my mentor, Dr. Jonathan Newman at NYU Langone, if there is a association between personal-level approaches to reduce exposure to particulate air pollution, using a HEPA filter, and a reduction of high blood pressure within those with hypertension. A HEPA filter, High Efficiency Particulate Air (filter) is a filter used to remove $PM_{2.5}$ particles inside small, indoor areas. Particulate matter is a mixture of solid particles that accumulate in the environment. The size of these particles varies as the particles include dust, smoke and soot. Some particles are emitted directly from a source, such as construction sites or fires, while others form in the atmosphere as a result of chemical reactions. Fine particulate matter, or $PM_{2.5}$, poses a higher threat to public health than PM_{10} . Due to the fine size of $PM_{2.5}$, it is easier to enter the lungs and bloodstream and can negatively effect an individual's overall and cardiopulmonary health.



CLASS OF 2022

KATERINA MAVROMICHALIS



Spontaneous Coronary Artery Dissection and Myocardial Infarction in the Absence of Obstructive Coronary Artery Disease

My research over the years has focused on observing the characteristics of MINOCA, SCAD and MICAD female patients to analyze the overlap and differences in characteristics among the groups. MINOCA is an umbrella term for a type of heart attack that occurs when the arteries are not blocked by plaque, this includes MI (heart attack) due coronary artery spasm, among others. SCAD is a rare condition where the coronary artery is obstructed by a tear in the coronary wall, which causes a heart attack. MICAD is a heart attack that occurs when the coronary arteries are obstructed by plaque, this is the most common type of heart attack.

Last year's research compared MICAD and MINOCA (including SCAD) in men and women with a relatively small sample size. This year, my research only includes women and will have four comparison groups: MICAD, MINOCA, SCAD and Takotsubo cardiomyopathy. Takotsubo cardiomyopathy is a temporary heart condition that is characterized by the enlargement of the left ventricle causing the heart to become weak and less functional. The inclusion of a Takotsubo group in the comparison allows for more observations to be made about the MINOCA and SCAD group. This year, additional variables will be included in the analysis like, troponin levels, B-type natriuretic peptide levels (BNP) and physical triggers. The data from each comparison group will be statistically analyzed through a test comparing categorical and continuous variables.

	MICAD (n=14)	MINOCA (n=9)
GENDER	3 WOMEN, 11 MEN	6 WOMEN, 3 MEN
AGE (mean)	64.14	55.8
PRIOR HEART ATTACK	5 (35.7%)	3 (33.3%)
HISTORY OF CANCER	3 (21.4%)	3 (33.3%)
SMOKER (prior and current)	8 (57.1%)	2 (22.2%)
HYPERTENSION	9 (64.2%)	6 (66.6%)
HIGH CHOLESTEROL	8 (57.1%)	6 (66.6%)
DIABETES	5 (35.7%)	0 (0%)
WALL MOTION ABNORMALITY	8 (57.1%)	4 (44.4%)
MIGRAINE	0 (0%)	2 (22.2%)
EMOTIONAL TRIGGER	1 (7.1%)	2 (22.2%)

CLASS OF 2022

JULIET ROMERO

Race and Ethnicity Disparities Regarding Access to Rehabilitation post-TBI

For my Science Research Project I am researching how race/ethnicity disparities are apparent in treating Traumatic Brain Injury (TBI) post-hospitalization. TBI is a brain dysfunction that occurs as a consequence of violent blows to the head and can cause long term-deficits in affected patients. Moderate to severe TBI discharged patients are expected to undergo a rehabilitation process to make a full recovery post-injury. However, access to these services for many is restricted due to their demographics. Statistically, White, middle to high income class individuals gain greater access to these rehabilitation facilities than African Americans, Asians, Hispanics, and other

minority groups. This leads to many patients experiencing the long term deficits associated with TBI. In my systematic review, I have enhanced my focus from last year's effort, which has transcended from online rehabilitation strategies for treating TBI to a demographic-centered TBI study on race and insurance-based disparities that impact access to rehabilitation services

under the mentorship of Enna Selmanovic, a Neuroscience PhD student at Icahn School of Medicine at Mount Sinai.



CLASS OF 2023

ANDREW FAZIO



College Students' Perspectives on LGBTQ Youth

Coming out can be a traumatic experience for lesbian, gay, bisexual, and transgender (LGBTQ) children. It is estimated that one in four teens are forced to leave their homes after coming out to their parents, and 68% have experienced family rejection. To raise awareness about this issue, 12 college students would be asked open-ended questions on how they feel about having an LGBTQ child. To diversify responses and promote in-depth insight, half will attend a conservative college and the other half a progressive college. Participants will be queried about the emotions they would experience and how, if at all, they would support their child. Data will be recorded verbatim and categorized into different sections depending on response trends. Hopefully, these studies can provide a clearer picture of what the next generation of LGBTQ youth can expect - and why.



CLASS OF 2023

EDWARD HARNETT

Type 1 Diabetes

The research that I will be conducting this year will be focused mainly towards living a healthy life while 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. It can be very difficult from time to time to try and manage one's blood sugar levels. Juvenile Diabetes affects the pancreas in people of all different ages. In my research, I will be examining how Type 1 Diabetes affects the different stages of life, and how each stage of life compares to each other. I will discuss with a younger child, a teenager, a middle-age individual, and an elderly person and see how they each compare to one another.



Diabetes mellitus



CLASS OF 2023

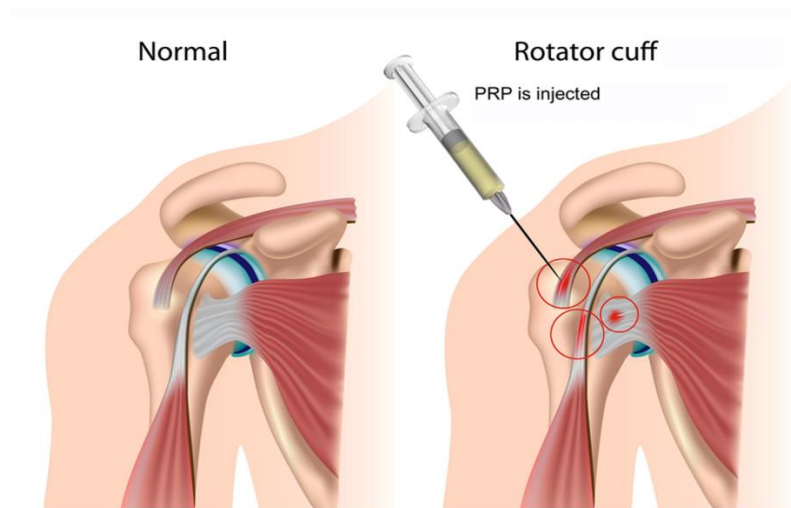
ALEXIS WIRTA



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. My project is focusing on a new technique of regenerative medicine. Thus far, the core of my project has been researching scholarly articles and meta-analyses conducted by medical professionals. These articles have not presented consistent results of PRP. Every article has the same limitation: there is no standardized treatment plan for PRP. Groups of patients have not all shown that PRP significantly helped their recovery time. This may be due to physical condition, age, and underlying problems (such as diabetes). To further my knowledge, I have been volunteering at Dr. Haritos' office and observing patients who have shoulder injuries. This year, I am planning on researching his patient data of those who have received PRP treatment.

The Use of PRP vs Surgical Solutions in Rotator Cuff Tears

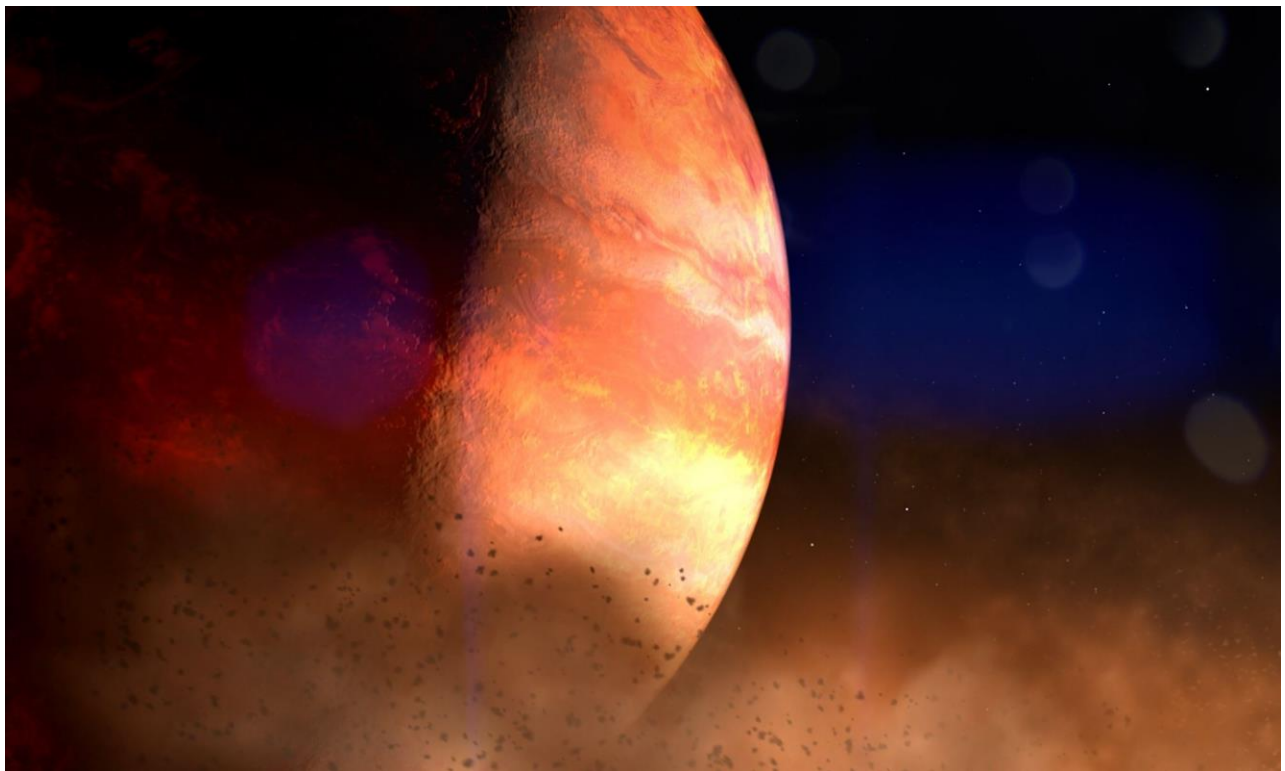


CLASS OF 2024

KLOE PIROVOLIKOS

Exoplanets

As of December 2021, there are over 4,800 confirmed exoplanets outside our solar system. Many of these planets have been discovered using indirect observation methods such as the Doppler technique, the transit method, and the radial velocity method. Certain direct observation methods, such as direct imaging and gravitational microlensing, have also been used successfully. In order to determine which of these exoplanets are worth investing, using resources to further study, it is important to look at their information, evolution and characteristics such as chemical composition, physical structure, and atmosphere. Learning to better detect and characterize these planets can help in determining whether a planet is potentially habitable and help us better understand the origins of life.



CLASS OF 2024

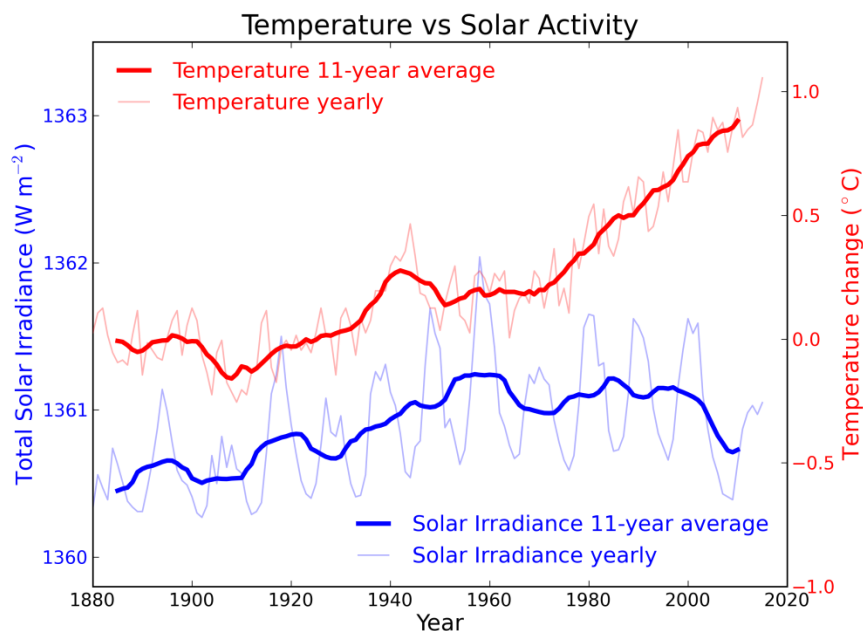
GEORGIA TENTOMAS



The Effect of Sunspots on the Earth's Climate:

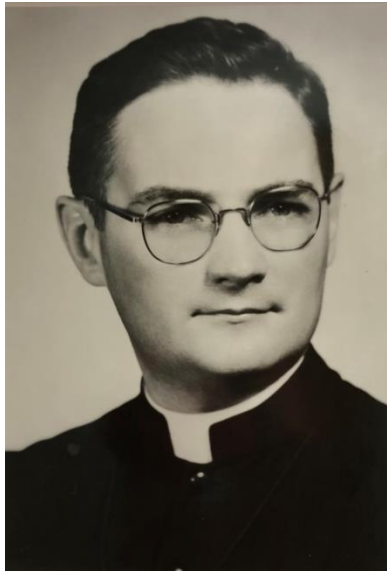
The sun is the center of our solar system and the primary source of energy for the climate system of the Earth. Sunspots influence climate around the world, contributing to a significant portion of the Earth's warming and weather. The purpose of this research is to bring attention to the theory that sunspots influence the climate of the Earth. This has been an important topic that has been deeply discussed within the scientific community, and there is much research supporting this idea. It is significant because the answer could majorly change the face of the research, and develop technology in order to continue this work and better understand their true development and involvement. It has been proven that there are certain multidecadal cycles that demonstrate a pattern between sunspots and the Earth's temperatures. The size and volume of the

sunspots can also have differing effects regarding the magnitude of their impact. Sunspots can also block electrical signals and absorb electromagnetic energy, making communication difficult. This study will compare numerous research articles, and pull various pieces of significant evidence in order to support this theory. I will complete this endeavor under the mentorship of Dr. Antonios E. Marsellos who is affiliated with the department of Geology, Environment and Sustainability at Hofstra University.



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 three-year 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

