

**BROTHER AUBERT HARRIGAN C.S.C.**

# **Science Research Program 2020**



**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*

*Student Poster Presentations*

*Senior 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 autism just to name a few. They have worked at Memorial Sloan-Kettering Cancer Center, Mt. Sinai Hospital, Lenox Hill Hospital, Brown University, 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, Saint John's University, New York University, Fordham University, and Rensselaer Polytechnic Institute. 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. I hope 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 Saint 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 2020

## NICHOLAS FARKASH



### Video Game Development

Under the mentorship of Dr. Edward Currie, a professor at Hofstra University, I am researching the process of video game development. When I meet with my mentor, we brainstorm ideas to implement into the game, work on the programming for said ideas, and test the game for any issues in the coding. With the help of my mentor and online resources, I will be working on a different game from last year, but the process of creating the video game remains the same. This process requires many different materials, the most critical of which is UNITY®. UNITY® is a cross-platform game engine used to bring the different aspects of video game development into one program, where it can then be assembled into a completed product. This is accomplished through coding, which is done using the C# language. C# is a computer programming language that is used by UNITY® to create scripts, the text files read by the computer to carry out instructions. Through the usage of UNITY® and C#, I will create a new video game to discuss and present at Symposium.

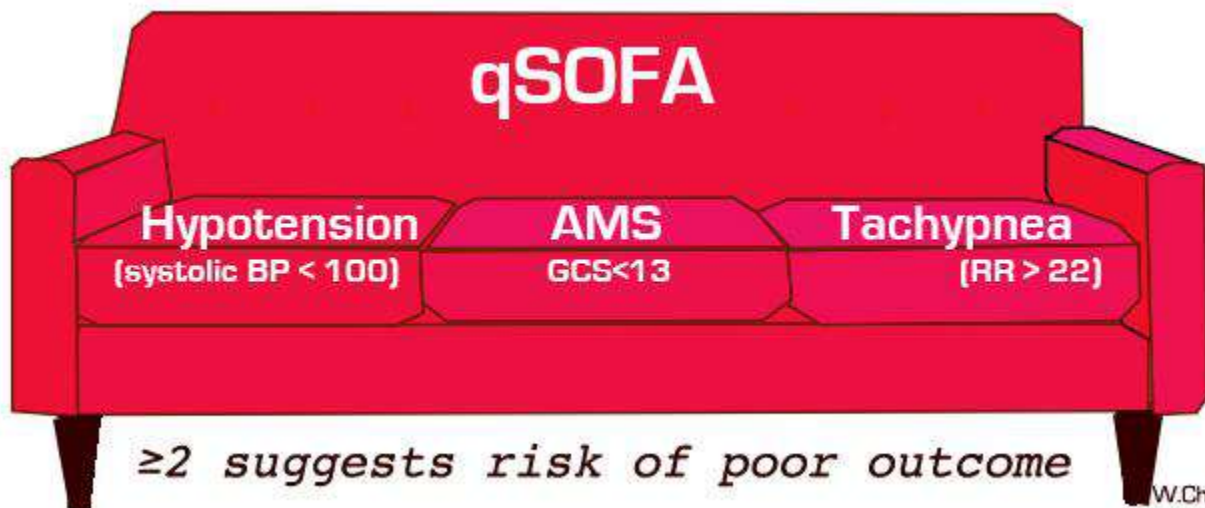
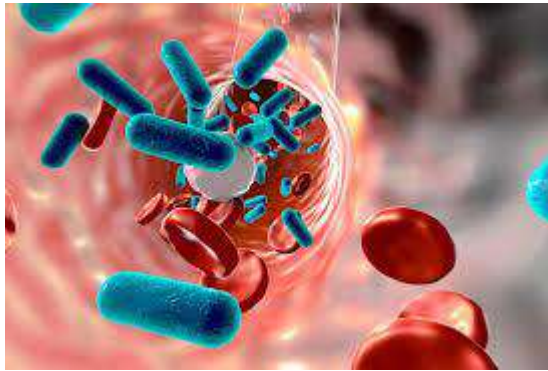




# CLASS OF 2020

## SEBASTIAN LIBUDA

My research is focused on sepsis identification. Sepsis is a bacterial infection carried throughout the bloodstream. The focus of my study is dedicated to qSOFA. QSOFA is a tool used to expedite sepsis identification. I work at Hoboken University Medical Center under the department of Emergency Medicine. I work alongside my mentor, Dr. Gerasim Orbelyan, in analyzing over 15,000 patient charts and evaluating over 300 patients. At the emergency department, I study the effects of sepsis and its impact on organ failure. My current research is focused on testing the validity of qSOFA in expediting sepsis identification. I analyze a number of factors in determining the sepsis infection.



W.Chan  
2016

# CLASS OF 2020

## JAHIR MORRIS



In continuing my work at Alley Pond Environmental Center (APEC), my research focuses on the observable changes in patterns of biological communities as a result of changes in temperature and subsequent weather. Although changes in temperature will have unique consequences to each individual species, it's changes in regard to the interactions between several organisms within an ecosystem that are truly indicative of how fluctuating temperatures will affect the environment. In conducting at the APEC Salt Marsh and Oakland Lake, I found that inhabitants such as fiddler crabs, songbirds, heron, rabbits, and even insects are perfect, when considered simultaneously, for indicating changes in their environment. By recording patterns in the size of their population, distribution throughout the ecosystem, and patterns in species specific behaviors, I can relate that information to abiotic conditions (temperature and weather) to formulate a conclusion as to what changes in the community have occurred. Data such as this plays a major role in the ongoing mission to pinpoint the effects that climate change will have on local environments. This way, further conclusion can be drawn as to how certain ecosystems will transform in response to the predicted changes in climate as well as what ways we might be able to counteract those changes.



# CLASS OF 2021

## CHRISTOPHER CHAN

Under the mentorship of Cheryl Reburiano, I have been following various drugs pertaining to the prevention of both the start and spread of Alzheimer's disease utilizing amyloid-Beta immunotherapy. Many of them are in phase 3 of the FDA clinical trials and as of now, it's currently a race to either pass phase 3 or be discontinued due to adverse events such as major medical problems due to side effects or ineffectiveness. One of the drugs still in the running, BAN2401, is the drug my mentor's company, Eisai, is responsible for. Future research, provided that BAN2401 passes phase 3, will consist of following it and any other drugs that have passed into phase 4.





# CLASS OF 2021

## MATTHEW CUTRONA



Under the mentorship of Dr. Mahmoud B. El-Tamer, breast surgeon at Memorial Sloan Kettering Cancer Center, I have continued working on my project “The Hidden Truth of Male Breast Cancer.” My project focuses on the male breast cancer, one of the most overlooked cancers in males. I will be researching male patients that have cancer in the breast. Under the guidance of Dr. Mahmoud B. El-Tamer, I will be writing an article to publish on the internet regarding male breast cancer. It will contain general information, especially the incidence, presentation, managing the cancer, and much more.

My plan is to continue my research project at Memorial Sloan Kettering Cancer Center, particularly the Memorial Sloan Kettering Evelyn H. Lauder Breast Center. I will be working alongside my mentor researching male patients, as well communicating new findings to my mentor.

### 5 ESSENTIAL FACTS ABOUT MALE BREAST CANCER



Look out  
for Lumps



Genetics  
Matter



Estrogen Boosting  
Health Condition



Age Plays  
A Vital Role



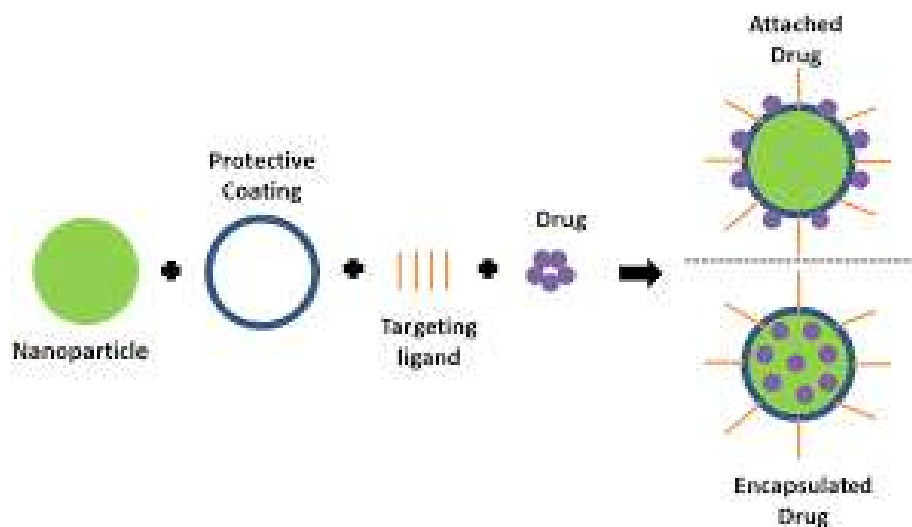
Distinguish  
Between  
Lumps & Gynecomastia

# CLASS OF 2021

## THOMAS GRAHAM

### Destroying Cancer Cells Using Nanoparticles

My research topic focuses on the effects of loaded nanoparticles compared to base drugs in regards to killing colorectal cancer cells. I am working with my mentor, Mr. Edwin C. Pratt, to test the effects of Loaded Nanoparticles versus the Base Drugs on AKP and Raw 246.7 colorectal cancer cell lines. This research is important to the field of cancer treatment as it can provide a new safer treatment options that patients can use. As I continue my research, I look forward to finding new and improved methods of treatment with the Nanoparticles, improving on the points of safety and optimal drug loading conditions.



# CLASS OF 2021

## SAMUEL LEE



Under the mentorship of Dr. Zachary Hickman, Director of the Neurosurgery Department at Elmhurst Hospital Center, I am researching Acute Alcohol Intoxication and its effect has on outcomes such as platelet function and rate of hemorrhage expansion. Acute Alcohol Intoxication is a condition that results when a person consumes a sizeable amount of alcohol in a short period of time. This can lead to deleterious complications and increases the chance of mortality. However, the effect of alcohol on the outcomes of Traumatic Brain Injury is still very controversial.



# CLASS OF 2021

## NICHOLAS MONIZ

This year, my Science Research Project will be on the grooming behavior and relationships of leader male hamadryas baboons to other males and females. I will be working with Professor Larissa Swedell at Queens College to conduct my research. Hamadryas baboon society is composed of several levels, being the troop, clan, band and one-male unit (OMU). The OMU consists of a leader male and several females, and occasionally has other follower males. The relationship between the leader male and his females is essential in maintaining the OMU. One activity done by hamadryas baboons to establish these relationships is grooming. Grooming is a very common behavior that occurs numerous times throughout the day, which involves brushing and cleaning another individual. I will be researching the frequencies of grooming given and received by the males to the other hamadryas baboons. Along with this, I will also be comparing the overall size of the OMUs, to see how the number of hamadryas baboons in an OMU influence a leader male's grooming behavior.





# CLASS OF 2021

## LUCA NITTI



I have been researching with Dr. Halley at St. Charles Rehabilitation Center for the last two years and we have been analyzing injury patterns between specialized athletes and multi-sport athletes. Specialized athletes, also known as single sport athletes, focus their time and energy into one sport. Multi-sport athletes play a variety of sports and do not focus on one sport for the majority of the year. Instead they play different sports year round using different muscles. We have been working together to decide whether being a multi-sport athlete or a specialized athlete is more beneficiary based solely upon injury history. The general trend within the results is that multi-sport athletes get hurt more often, however specialized athletes become injured more often. The difference being is that injuries are more severe and result in longer recovery times rather than being hurt. This difference is due to the fact that specialized athletes use the same part of their body year-round which causes fatigue and stress fractures. On the other hand, multi-sport athletes use different parts of their body and will only become hurt more often due to the fact that they play games in multiple seasons of the year.





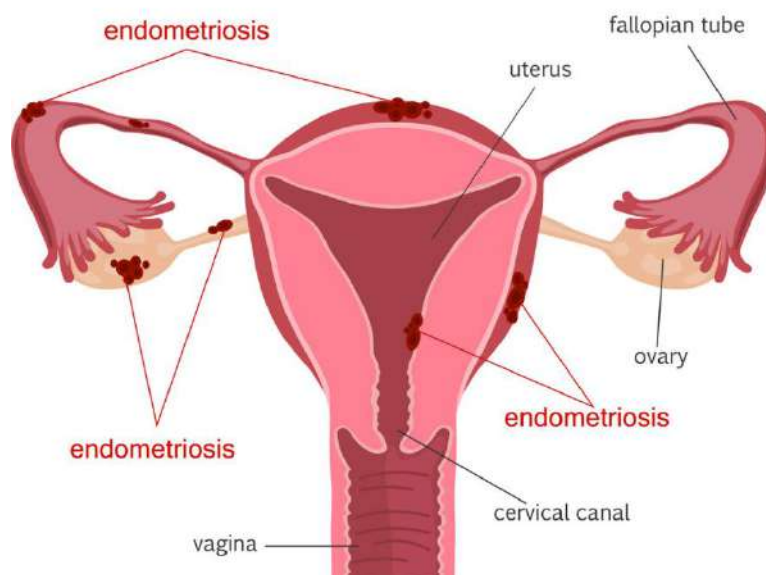
# CLASS OF 2022

## GABRIELLA AORDKIAN

My science research will be focusing on endometriosis, which is a condition where endometrial tissue grows outside the uterus usually in the abdominal cavity or on internal organs. I am researching this condition under the mentorship of Dr Metz, PhD, at the Feinstein Institute of Research in Manhasset. Endometriosis can take up to 10 years to be diagnosed due to the fact that its symptoms are often confused with other conditions. Therefore, I am interested in this topic in the hopes that quicker diagnosis and treatment would be found with further research on this condition.



### ENDOMETRIOSIS

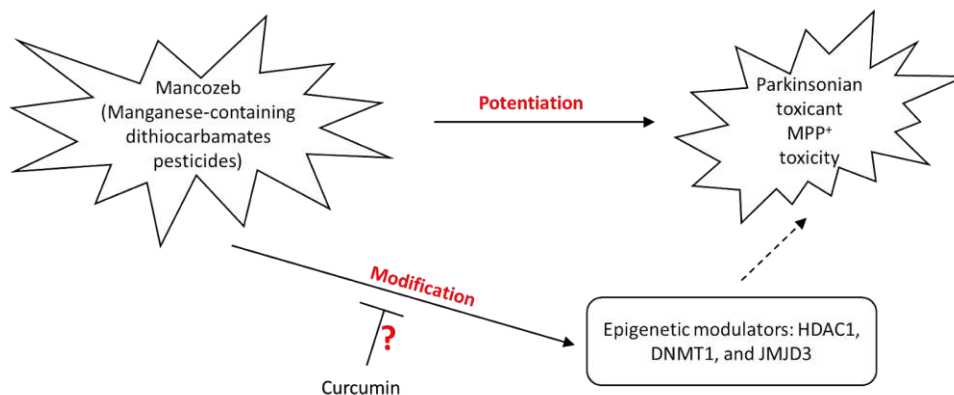


# CLASS OF 2022

## ELENA DELGADO



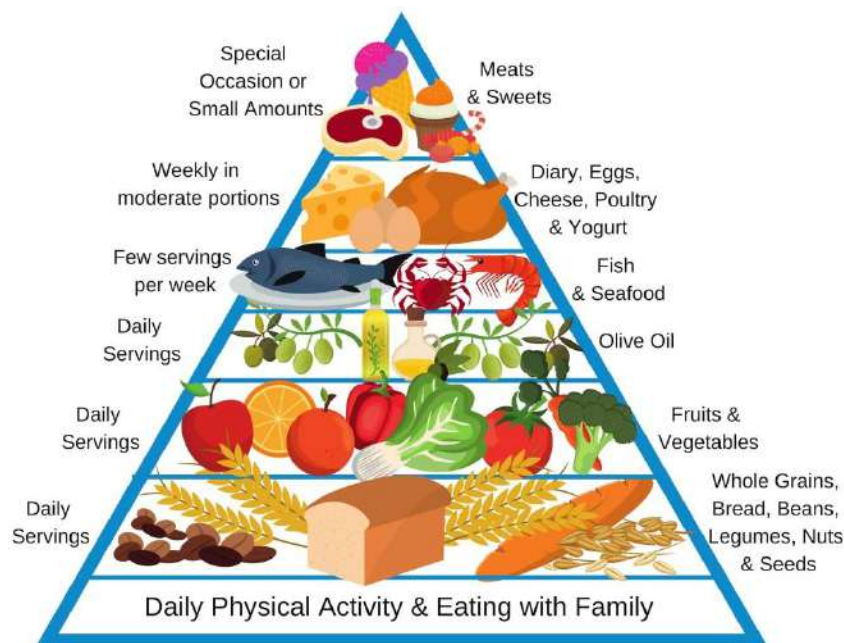
I will be researching the effect of curcumin on epigenetic modulations triggered by manganese-containing dithiocarbamate pesticides under the guidance of my mentor, Dr. Shu-Yuan Cheng at John Jay College of Criminal Justice. What a person ingest into their body can cause epigenetic modification to occur. Manganese is an essential mineral that your body needs in small amounts. When an abundance of manganese is found in your body it can harm your body and has also been associated with the development of neurodegenerative diseases, such as Parkinson's disease. Manganese-containing dithiocarbamates, such as mancozeb (MZ), have been shown to trigger potentiation effect on parkinsonian toxicant MPP<sup>+</sup> toxicity. Curcumin is a natural chemical compound found in the spice turmeric and is known to have many health benefits. Recent studies show that curcumin has anti-inflammatory, anti-oxidant, and anti-cancer properties, and has a great potential to act as an epigenetic modulator. More specifically in my study, I will investigate whether curcumin can attenuate mancozeb (MZ) triggered epigenetic modulation in rat neuronal PC12 cells.



# CLASS OF 2022

## IRENE MAVROMICHALIS

Under the mentorship of Dr. Jonathan Newman, a cardiologist at NYU Langone, I will be researching the relationship of a Mediterranean Diet and lowered risk of cardiovascular disease. The Mediterranean Diet consists of fresh fruits, vegetables, nuts, olive oil, whole grains, eggs, fish, and poultry. This diet is beneficial to cardiovascular health because it is rich in polyunsaturated fats which lowers low – density lipoprotein cholesterol. This type of cholesterol has a negative effect on the heart because the cholesterol begins to buildup and narrow the walls of the arteries which can completely block the arteries.



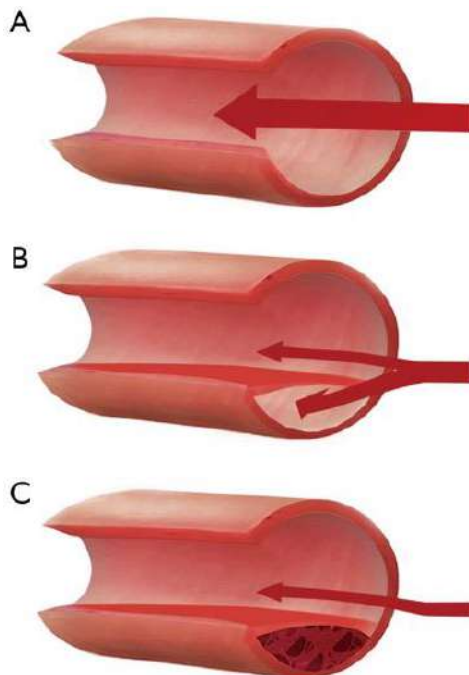
**MEDITERRANEAN DIET**

# CLASS OF 2022

## KATERINA MAVROMICHALIS



Spontaneous Coronary Artery Dissection or SCAD is an obstruction in the coronary artery that causes it to dissect. The dissection is characterized by extreme stress, especially in young women. A significant increase in hormones, from pregnancy or hormone therapy, acts as a precipitant for SCAD. Hormonal changes during pregnancy physically change the arterial wall making it more susceptible for dissections. Pregnant women (especially women who have been pregnant before) with SCAD tend to have poorer prognosis than women who are not pregnant. Raising awareness for SCAD is important because it is constantly misdiagnosed as an atherosclerotic condition. Coronary angiography aids in the proper diagnosis for SCAD



# CLASS OF 2022

## JULIET ROMERO

For my Science Research project, I am researching the long term impacts of Traumatic Brain Injury, with a particular focus on adolescents. Pediatric TBI is a major concern due to the fact that adolescents are more vulnerable to permanent brain damage regarding their social and behavioral function compared to well-developed adults suffering with the disease. Specifically, I am researching how the severity of the injury and the initial behavioral and social functionality may variously impact the long term symptoms of TBI, as well as which methods dependable in predicting the outcome of pediatric TBI patients. I will be researching this topic under the guidance of Raman Sharma, MD at Memorial Sloan Kettering Cancer Center.



### Childhood Brain Injury





# 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.

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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.



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