

**PRISM**  
at **JOHN JAY COLLEGE**  
PROGRAM FOR RESEARCH INITIATIVES  
IN SCIENCE AND MATH



# Undergraduate Research **CHRONICLE**

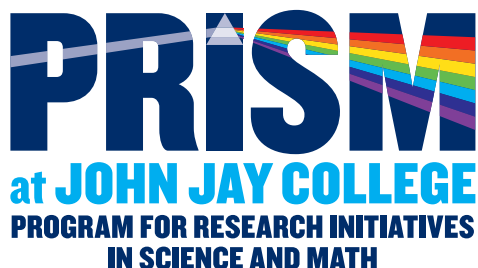
**2024**

choose your future

challenge yourself

investigate

engage



network

inquire

examine

build connections

question

choose your future

**President**

Karol V. Mason

**Provost**

Allison Pease

**Vice-Provost and PRISM Director**

Anthony Carpi

**PRISM Associate Director**

Edgardo Sanabria-Valentín

**Science Grant Program Manager**

Rachel Perlman

**PRISM Staff**

Derek Casarrubias

Oscar Cifuentes

Alejandra Myerston

Patricia Samperi

**Chronicle Editor-in-Chief**

Edgardo Sanabria-Valentín

**Chronicle Co-Editor**

Patricia Samperi

**Chronicle Content Editor**

Alejandra Myerston

**John Jay Marketing Liaison**

Laura DeVries

**Designer**

Alpha1C

**Cover Shot:**

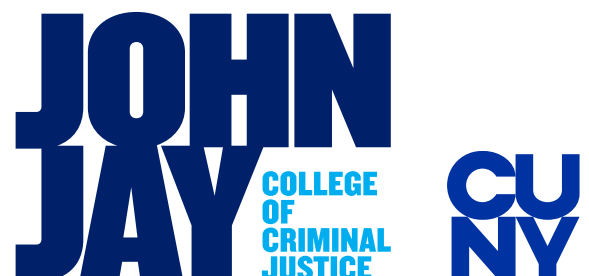
Méret Oppenheim, a celebrated artist, was a leading figure in the 1930's Surrealist movement. Oppenheim's best-known artwork is Object (Le Déjeuner en fourrure), which consists of a teacup, a saucer and spoon covered with fur (see page 7 for a picture of the piece). For years it was thought the fur came from a Chinese gazelle, but experts at New York's Museum of Modern Art (MoMA) determined this to not be true. PRISM's Selin Ates (page 7) and her mentor Dr. Nathan Lents have been commissioned by MoMA to determine the fur's provenance using our state-of-the-art DNA extraction and analysis tools. Pictured is the follicle of one of the hairs removed from the piece that are being used in their analysis.

PRISM is sponsored by external grants, and by the philanthropic support of generous individuals.

To support and partner with PRISM, scan this QR code with your smartphone or visit:

<http://www.jjay.cuny.edu/support-prism>

Follow us on Twitter and Instagram @JJCPRISM



# Contents

Introduction **5**

Undergraduate Researchers **7**

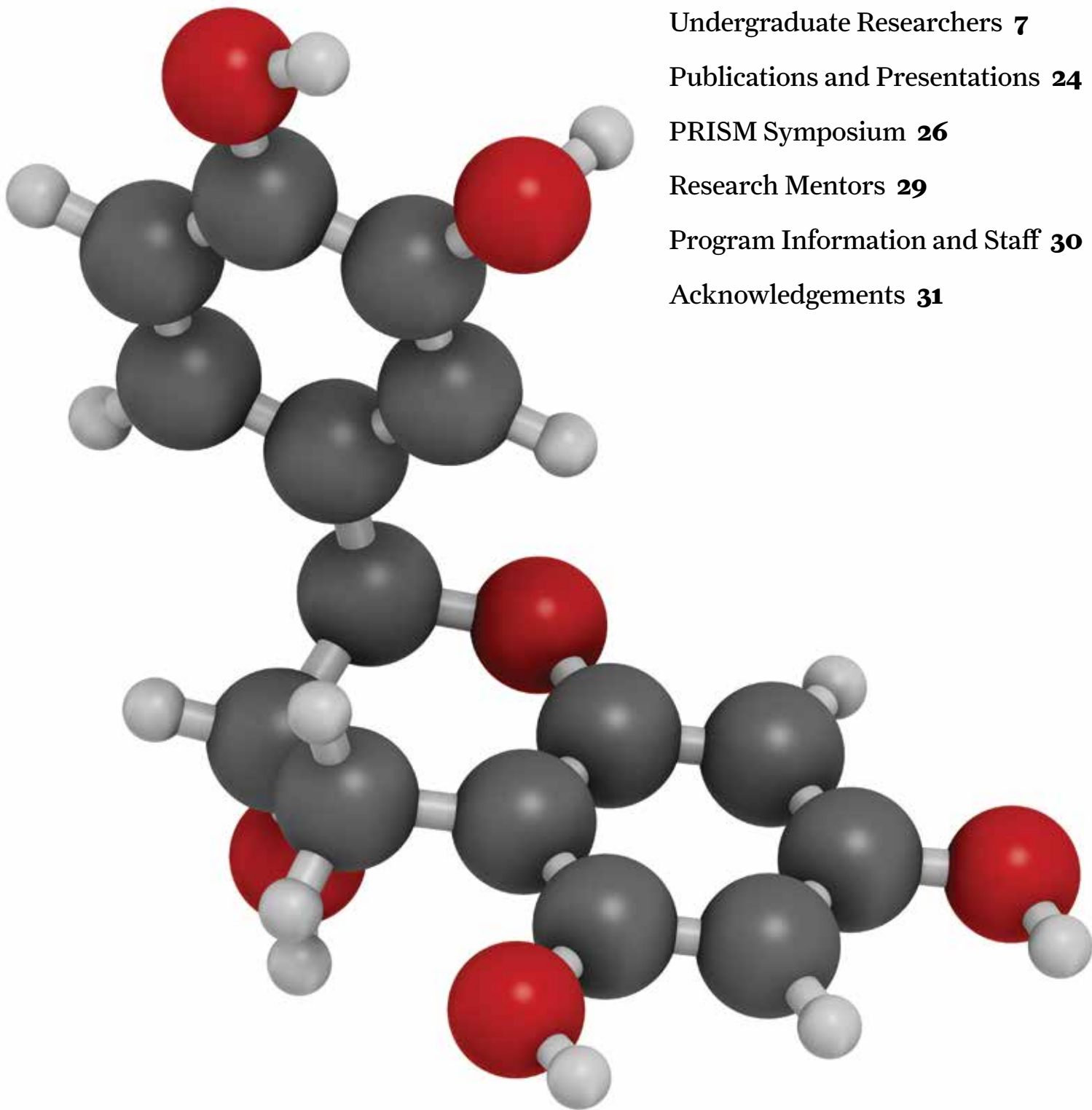
Publications and Presentations **24**

PRISM Symposium **26**

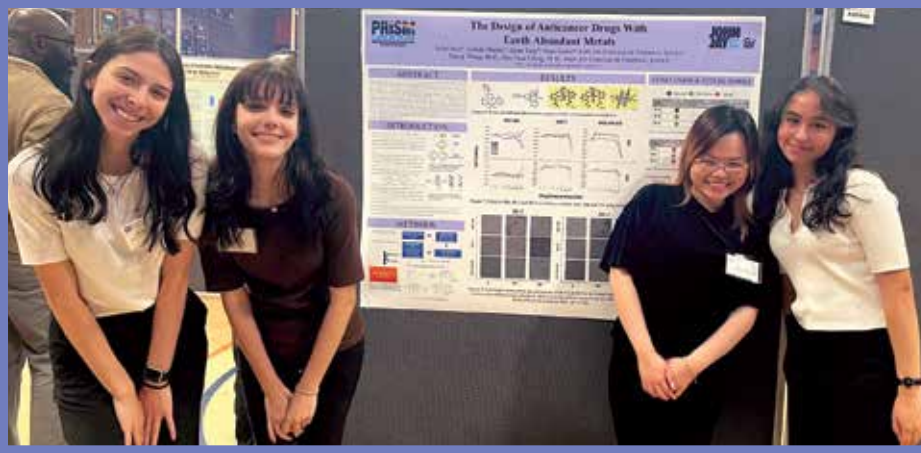
Research Mentors **29**

Program Information and Staff **30**

Acknowledgements **31**



This publication was produced by the Program for Research Initiatives in Science and Math (PRISM) in collaboration with the Office of Marketing and Development at John Jay College of Criminal Justice of the City University of New York. Reproduction in whole or in part without written permission is prohibited. For more information please email the staff at [PRISM@jjay.cuny.edu](mailto:PRISM@jjay.cuny.edu) or visit [www.jjay.cuny.edu/PRISM](http://www.jjay.cuny.edu/PRISM)



**“ PRISM has helped me become more confident in my abilities and challenged my critical thinking skills. ”**

**—Amarelis Lava**



**“ Research isn’t just protocols and goals, it’s taking advantage of your curiosity to advance your own and other’s knowledge. ”**

**—Klaudia Baran**





**ANTHONY CARPI**  
PRISM Director



**EDGARDO SANABRIA-VALENTÍN**  
PRISM Associate Director

In the last seventeen years, PRISM has impacted over 800 John Jay STEM students during their college experience. Our guiding principle is simple: to provide resources for you to succeed in your academic life and to help you prepare for your professional life. Our mission reflects the distinct nature of our school: to “educate fierce advocates for justice” and to diversify the STEM workforce by “embracing the unique backgrounds” of our students. **Your success is our reward.** To date, of the over 375 undergraduate researchers who have been part of PRISM, more than 150 have gained acceptance to postgraduate programs in STEM, healthcare, and other professions, and 48% of them come from backgrounds typically underrepresented in these fields.

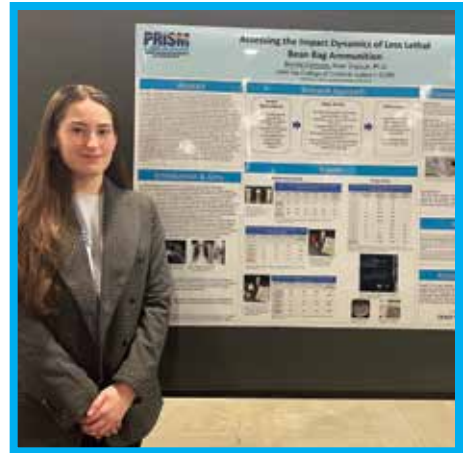
Last year we were nominated and became a finalist for the Examples of *Excelencia*. This honor, bestowed by the national organization *Excelencia* in Education, recognizes what works in higher education to accelerate Latino success to address the U.S. need for a highly educated workforce. PRISM, together with John Jay’s Accelerate Complete, Engage (ACE) Program, was selected from hundreds of applicants to be part of the 2023 cohort of four Baccalaureate-level finalists. **Your successes are our rewards.**

And we want to reward and recognize your hard work, as you continue adding to our success stories. Brooke Fontaine (page 8) and Gabriel Martinez, from our STEM Scholars Program (SSP) applied and were selected to participate in summer research programs at University of Pennsylvania and Brown University. Samantha Davis (page 9) and David Pintor (also from SSP) will be joining the Memorial Sloan Kettering (MSK) Cancer Center’s ENGAGE Program, which combines participating in a summer research experience this summer with a research post-baccalaureate program after their graduation next year to help them pursue doctorates in STEM. Jayla Evans (page 20), Nicholas Fraschilla-Brodskin (page 20), and Lakshmi Rao (page 15) have received offers to join doctoral programs at Stony Brook University and St. John’s University, while this year’s PRISM Outstanding Undergraduate Researcher (OUR), Rachel Calvagna, will be pursuing a master’s program in environmental toxicology at NYU. Mariam Diakite and Mia Sorrentino from SSP have secured internships this summer at the American Museum of Natural History and at the Innocence Project, respectively, through our partners at the CUNY Inclusive Economy Initiative. Among our alumni, other PRISM family members are also thriving. Alejandro Ocampo (PRISM’s OUR ’20) recently began his career as a Criminalist 2 in the Forensic Biology Department at the NYC OCME, while Lisset Duran (PRISM’s OUR ’18) presented her doctoral dissertation at Princeton on May 2, 2024. And this is just a sample, since we ran out of space!

Our commitment to support you on your journey to become professionals in science and technology remains steadfast. We are and continue to be exceedingly proud of you and your accomplishments as you become FIERCE ADVOCATES FOR DIVERSITY, INCLUSION, AND JUSTICE IN SCIENCE!

“ Being in PRISM has taught me to be resilient and continue to persevere as a researcher and future scientist. ”

—Aliesha Z. Hetnarine



“ Joining PRISM allowed me to apply what I have learned and put my knowledge to the test. ”

—Selin Ates



# UNDERGRADUATE RESEARCHERS

**John Jay PRISM Undergraduate Researchers conduct mentored research in five broad disciplines—forensic science, biomedical sciences, toxicology, organic chemistry, and computer science. Together with their Faculty Mentors, they are pushing the boundaries of science. The following pages contain more detailed information about our incredible students and the innovative research projects on which they work.**

## FORENSIC SCIENCES

The field of forensic science applies varied disciplines—including biology, chemistry, anthropology, and psychology—to investigate crimes related to criminal and/or civil law. A forensic scientist preserves and analyzes evidence using techniques from these scientific disciplines, while maintaining legally mandated standards so that the evidence is allowable in court.

### Criminalistics

Criminalistics uses scientific methods and principles during the criminal investigation process to analyze physical evidence—such as chemical traces, ballistic evidence, controlled substances, genetic material, and marks on tools employed in a crime. PRISM students use the latest technologies to develop more sensitive methods for the detection of illicit substances and to analyze evidence found during criminal investigations.

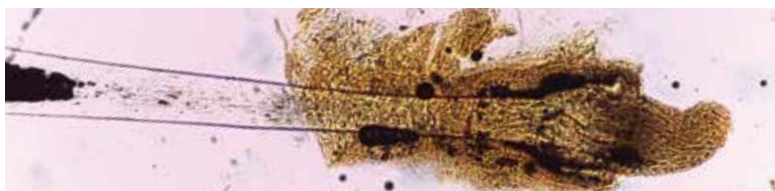
### Selin Ates

#### **Extraction of DNA from Historical Art Piece for Species Determination (Dr. Nathan Lents)**

Though I have always had an interest in science, I never would have guessed that I would be pursuing it as a career. My interest in forensic science really grew in high school after realizing I could combine two interests: science and crime-solving. Joining PRISM allowed me to apply what I have learned and put my knowledge to the test. Being able to explore the unknown and experiment in the lab has been exciting and eye opening since I never know what my experiment will result in. Drawing on my PRISM research experience, I plan to continue onto graduate school and get my master's in forensic science.



The Museum of Modern Art has commissioned us to identify the animal species whose fur was used by artist Meret Oppenheim in her sculpture titled “Object (Le Déjeuner en fourrure).” We are currently experimenting with several methods to determine the optimal procedure to extract DNA from the highly degraded sample.







## Jaelynn Avila

### Every Contact Leaves a Trace: Identifying Bullet Traces and Possible Debris in Skeletal Remains Through Histopathology (Dr. Angelique Corthals)

My parents were fascinated by true crime stories and shared their passion with me. This passion ignited my interest in forensic pathology, which combines puzzle-solving with medicine. Since then, my career aspirations have shifted to emergency medicine after working as an Emergency Medicine Technician for almost a year. Despite this shift, I remain drawn to forensics and have gotten to continue to explore this passion in my project on trauma histomorphology with my mentor.

My research project focuses on studying how cremation can affect bullet residues from a gun wound. We do this by identifying bullet components in cremated pig remains. Understanding this could aid in unsolved cases.



## Suleidy De La Cruz Baez

### The Battle of the DNA Bots (Dr. Mechthild Prinz)

I have always been described as an inquisitive and creative person, constantly trying to figure out how things around me worked or trying to create something of my own. For me, explaining scientific concepts, successfully carrying out experiments and learning new things always makes me feel an indescribable sense of joy. Even as a child, I knew I wanted a career in science. In high school I was placed into a forensic science class, and I loved every second of it. I yearned to learn more and decided I wanted a career in forensic science. Thanks to Dr. Prinz

I was able to discover my passion for working in a lab. As a member of PRISM, I have learned that research

takes a lot of time and dedication, but it is worth every second.

My research compares manual and automated DNA extraction methods for biological evidence to compare the quality and quantity of extracted DNA. The manual method explored is the Chelex 100 protocol and the automated DNA extraction methods to be compared in this research will be the EZ1 Advanced and QIAcube robots from QIAGEN. Our work will allow other forensic scientists to determine which method is best to use in different types of evidence.



## Brooke Fontaine

### Assessing the Impact Dynamics of Less Lethal Bean Bag Ammunition (Dr. Peter Diaczuk)

Growing up, I was always curious about the world around me. From the first time I used a microscope when I was young, I knew that I wanted to pursue a career in science. I first learned about forensic science through popular crime television shows. Ever since taking a forensics class in high school and interning at my local forensics' laboratory, my passion for this field only grew. Joining PRISM has not only helped me become more confident in researching and problem solving, but it has provided me with unique opportunity to learn and work with experts in their fields.

Bean bag ammunition is one of the many types of less lethal ammunition used by law enforcement to control various situations. For my research, I investigate the effectiveness and potential damage of bean bag ammunition on simulated body tissue to provide guidelines to law enforcement for the use of this ammunition in crowd control.

## Olsmaël Mérisier

### The Effects of Over-Lubrication of a Gun Barrel on Discharged Cases and Bullets (Dr. Peter Diaczuk)

I love science! Studying biology and chemistry and doing research at John Jay has allowed me to explore why things operate the way they do. With my forensic science degree, I hope to earn my commission in the Air Force and work in the Office of Special Investigations. My goal is to become a forensics expert for the Air Force, working in crime science across multiple Air Force bases and serving as an expert witness in court. When I separate from the Air Force, I will use my experience and military training to work in the civilian sector, hopefully at a Forensics Lab with the FBI.

My project explores the effect that over-lubricating a gun barrel has on the bullets fired. By examining bullets and cartridge cases shot from the same firearm with varying levels of lubrication we can determine if there is an effect on the marks formed on a discharged bullet as it passes through the gun's barrel.



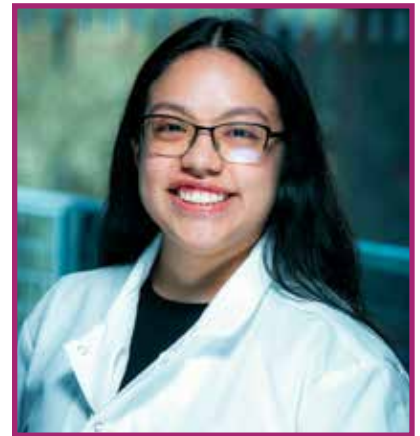
## Diana Muñoz Ortiz

### The Evaporation of Smokeless Gunpowder Over Time (Dr. Peter Diaczuk)

I have always been interested in knowing how the world works. As I grew up, I began to understand science at a deeper level and decided to pursue a career in science. When I first began taking my forensic science course in high school, I didn't know that the class was going to change my life. I became passionate about forensic science and that is when I decided to study forensic science at John Jay. PRISM has allowed me to work with amazing people who can help me develop new experiences and skills as a researcher. My goal is to apply the skills I have learned to continue working in research at a government agency or in a laboratory.



My research focuses on the evaporation of chemicals present in smokeless gunpowder. We measure the weight of the gunpowder from different cartridges and analyze them to provide insight into what chemicals in the smokeless gunpowder evaporate first, providing a way to date their residues.



## Forensic Entomology

Entomology is a branch of biology that studies insects. Forensic scientists often use the identification of insects in or around a cadaver or other remains to determine the time of death, or whether a cadaver was moved after death. Our students are studying how environmental and ecological factors found at a crime scene affect the determination of a victim's time of death.

## Samantha Davis

### Investigation into the Microbiome Composition of Blow Fly Eggs Using Next Generation Sequencing (Dr. Jennifer Rosati)

Having the experience of being a STEM student has brought so much joy into my life. Being able to conduct research in the sciences allows me to explore such a wide variety of fields that have the potential to make huge impacts on people's lives, and that experience is irreplaceable. After changing my major in my freshman year from forensic psychology to forensic science and deciding to pursue a PhD, I have never felt more on the right path, and I cannot be more thankful for my family, friends, and mentors who have supported me in pursuing my passion for science.

In my project, we investigate the microbiomes that exist on the eggs of different species of blowflies. This research is being done to increase our understanding of why blowflies colonize on a corpse, whether it be because of chemical signals, microbial signals, or both.





## Amarelis Lava

### Case Simulation Micro-Study: The Effect of Body Exposure on Blow fly Colonization (Dr. Jennifer Rosati)

When young, I was obsessed with documentaries revolving around true crime and how forensics aided in crucial discoveries postmortem. I was always curious about how these discoveries were made and asked my parents questions like “how” and “why”, although my parents could not give me many answers. My curiosity continued to grow, leading to my decision to pursue science to find out for myself. I want to pursue a career that involves being in the field, such as a forensic autopsy technician or

a forensic medical examiner. PRISM has helped me become more confident in my abilities and challenged my critical thinking skills in addition to opening different roads for me to pursue within forensics.

My research quantifies changes in blow fly colonization behavior by measuring its time and location of colonization. Small changes in the colonization (or egg-laying) behavior of blow flies can have large impacts when using their larval developmental cycles in post-mortem investigation estimations.



## Alex Win

### Detection of Gunpowder Residues in Blowfly Larvae: Investigating the Use of Blow flies as Post-Mortem Indicators of Firearm Use in Homicide Investigations (Dr. Jennifer Rosati & Dr. Peter Diaczuk)

With time, I've come to realize that scientists are superheroes. It is so cool that we have gotten people to fly in the air like Superman and to scale tall heights like Spider-Man; but it was mind blowing when I found out that it was research that allowed us to do these things by designing jet packs and gloves with gripping materials inspired by gecko's skin. But I've found the real superpower is the way we use research to help people - like with vaccines and hybrid vehicles. Ever since, I've made it my goal to learn this power too and use it for the betterment of those around me.

Just like we can now tell if the cow you're eating was fed grass or corn, forensic entomologists can tell if fly larvae fed on a cadaver who died from a meth overdose. We found out that certain substances present in the deceased are detectable in forensically important fly larvae, and now we'd like to know if gunpowder is one of them.

## BIOMEDICAL SCIENCES

Biomedical scientists apply observations of the natural world along with biological and physical scientific techniques to create interventions and develop technologies that improve healthcare and public health worldwide. Biomedical sciences apply the principles of these disciplines to topics related to infectious or non-infectious diseases that affect all humans.

### Cell Biology

Cell biology studies the structure and functions of cells. This discipline looks at the physiological properties, metabolic processes, signaling pathways, life cycle, and interactions between cells in an organism and between cells and their environment. At John Jay, our students are trying to understand the function of genes that control cancer development and inflammatory disorders, and how microRNAs (short non-coding RNA molecules, also known as miRNAs, that bind messenger RNA) can affect gene expression.

## Klaudia Baran

### The Relationship Between Metabolic Genes and Chronic Pain (Dr. Angelique Corthals)

The anatomy & physiology class I took during my senior year in high school sparked my fascination with the human body. My experience with PRISM has taught me that research isn't just protocols and goals, it's taking advantage of your curiosity and love for a certain topic to advance your own and other's knowledge. It's something that has the potential to make the world a better place if you try hard enough. I plan to obtain an MD/PhD in pathology/regenerative medicine and pursue a career in forensic pathology and biomedical research.

My research work focuses on finding a medically exploitable relationship between metabolic genes and the genes involved in inflammatory responses found in chronic pain patients. Understanding this relationship will help pave the road towards a better life for those suffering from chronic pain.



## Sylvie Bural

### Interactions Between Green Tea Polyphenols and miRNAs (Dr. Lissette Delgado-Cruzata)

I am fascinated by science and the discovery process, and I want to be a part of those future discoveries. Whether a small success or not, I know every scientific finding is crucial for the future, and that each finding leads to a new experiment. I have learned that with passion comes an exuberant amount of work and that research prepares me to “expect the unexpected.” I aspire to be a medical scientist and do extensive research to discover cures or effective treatments for diseases. After graduating from John Jay, I will pursue a PhD. I have enjoyed rubbing elbows with my peers that share the same passion for science as well as all the new connections I am making as part of PRISM.

Green tea is known to contain a lot of powerful antioxidants like polyphenols. miRNAs will be studied in breast cancer cells after being exposed to green tea-derived polyphenols like EGCG. Assessing changes in miRNA levels after being exposed to polyphenolic compounds allows us to know if these compounds could potentially reduce the cancerous properties in cells.



## Ashley Kaswer

### Ingenuity Pathway Analysis of the Impact of the Impact of Mitomycin C (MC) and Decarbamoyl Mitomycin C (DMC) in Cell Cycle Regulation (Dr. Shu-Yuan Cheng)

I'm a scientist because of my high school chemistry teacher. Watching her passion teaching was like peering through the looking glass at my future self. After graduation I plan to pursue a PhD in chemistry, with the aspiration of becoming a forensic chemist at a federal lab and an expert witness in court. Being in PRISM and working with my mentor allows me to flourish as a researcher, to expand my knowledge and proficiency in areas I have not explored before, and to make connections that will last a lifetime.

In my lab I'm looking at the cell cycle of cancer cells treated with the chemotherapy drugs MC and DMC, utilizing bioinformatics to analyze large sets of gene expression data. This is crucial for cancer research because determining how these drugs target cancer cells can guide us to develop drugs that won't target healthy cells.



---

## Genetics

Evolution results from changes in the genetic material, or genes, of a species over time. These genetic changes can provide adaptations that give an evolutionary advantage to the organism when faced with changes to its environment. Evolutionary genetics aims to identify changes in genes that lead to the evolution of species. At John Jay, our students compare the genes of primates to those of humans to understand what makes humans unique and study how urbanization affects the genetic diversity of invertebrates in NYC.



### Olivia Fratangelo

#### Phylogenetic Analysis of the Role of miRNA in Human Evolution (Dr. Hunter Johnson)

The contrast between the disciplines I am pursuing in my degree, computer science and philosophy, allows me to strengthen both my technical and creative skills while exploring the ethical and legal issues that come with modern technology. I have always been naturally curious and inclined toward science. I especially enjoyed taking AP biology in high school and am so grateful to be connecting with my background in science again while using my computer science skills. Participating in PRISM has pushed me out of my comfort zone and introduced me to so many exciting new ideas and opportunities.

My lab studies the evolutionary significance of miRNA in humans, and my project uses computational methods to examine the relationships between us and our ancient relatives, neanderthals and denisovans. I am using phylogenetic trees to visualize this data to show how miRNA have evolved over time in relation to their gene targets.



### Brianna Jenkins

#### African Genetic Ancestry and the Slave Trade in Brazilian Women with Triple-Negative Breast Cancer (Dr. Lissette Delgado-Cruzata)

I remember watching TV shows about forensic science on television when I was younger. This piqued my interest in science. I was always curious how the body works and what we can learn from the human body post-mortem. Research is not linear by any means. It has taught me that you keep learning throughout the process. Participating in PRISM showed me that research is hard work, but it is rewarding when you get to share your findings with others. My goal is to apply to medical school after which I aspire to become a neurosurgeon or cardiothoracic surgeon; or to pursue a MD/PhD program to get both aspects of a scientist and a physician. I really enjoyed learning the process of research from beginning to end with my mentor.

Triple-negative breast cancer is the most aggressive form of breast cancer in women. My research entails studying what causes higher mortality rates from triple-negative breast cancer in women of African-descent compared to White women. Our goal is to help develop proper evaluations and treatments that might ease this racial health disparity.

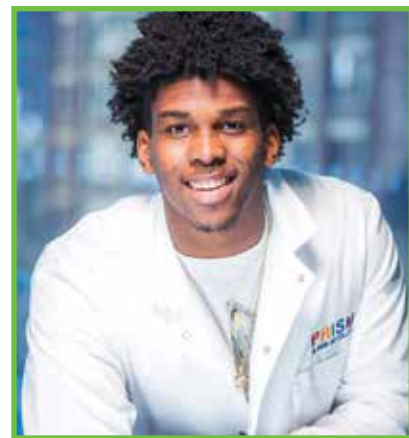


## Marc Louis

### Comparing Single Nucleotide Polymorphisms between Neanderthals and Humans to Identify Variations in Xenobiotic Metabolism (Dr. Nathan Lents)

My love for science started during middle school when one of my teachers introduced me to the fascinating world of chemistry. Nearly 10 years later as a junior I have the privilege to be majoring in toxicology and making my younger self proud. After John Jay, I would like to enter a physician assistant master's program and further seek out research opportunities in pharmacogenetics. Research as a whole taught me that the most important thing is staying disciplined throughout the entire experience. As scientists we have to continue to pursue and stay focused despite tribulations.

Our research aims to identify variations between the genomic sequences of Neanderthals and humans, focusing on genes involved in xenobiotic (drug) metabolism. Understanding allelic variations in this category of genes can help us discern their potential function and further the field of pharmacogenetics.



## Julian Morales

### Analysis of the Evolution of miRNAs in Humans and our Comparative Development (Dr. Nathan Lents)

Being the child of first-generation Hispanic immigrant parents illuminated the need to have individuals who could relate to, and face head-on, the medical, economic, and social challenges inherent in New York and who share similar appearances and voices to mine. I majored in forensic science because of my profound belief in the power of STEM to drive positive change in the criminal justice system. I am researching our evolutionary history as a species, making connections between biology and our development, and plan to use the analytical skills I've gained to become a crime lab analyst.

For my research, I explore underexamined evolutionary trends in miRNAs using biostatistical methods. We are trying to determine which miRNA gene-target relationships are human-specific and which ones are conserved in ancient human relatives and apes to see what these relationships say about our evolutionary development.



## Dewan Sadiyah

### Identifying miRNA Targets and Affected Pathways in Latinx Patients with Rheumatoid Arthritis (Dr. Lissette Delgado-Cruzata)

From a young age, I found joy in exploring the intricacies of the physical and biological world. My research experience has equipped me with valuable skills, including critical thinking, analytical abilities, and effective communication, which I can readily apply to various aspects of my daily life. I aspire to become a medical doctor to contribute to the well-being of individuals and make a positive impact on their lives. Being a part of PRISM and working alongside my mentor has taught me to be patient and trust the process as the end results will be worth it.

Rheumatoid Arthritis (RA) is one of the many diseases for which racial and ethnic minority groups have worse outcomes than other groups. Our research findings show that various miRNA targets and associated affected pathways play a key role in the pathogenesis and pain associated with RA in one of these populations.





## Avani Seelall

### Triple-Negative Breast Cancer in Women with African Ancestry (Dr. Lissette Delgado-Cruzata)

My strong passion for science has only grown larger throughout the years. This field intrigued me because I wanted to discover how the world works and my experience at John Jay has given me a chance to do this, down to the molecular level. Innovations are constantly being made and I find it exciting to be there in the lab when they happen. As a career, I aspire to work full time in a forensic toxicology lab or one doing research to improve health. My goal is to utilize my laboratory skills to help many people, especially those who cannot help themselves.

Breast cancer is a leading cause of cancer death in women, and triple-negative breast cancer (TNBC) is one of its most aggressive forms. TNBC has the lowest survival and highest recurrence rate among breast cancers. We study TNBC in women with African ancestry to find the best way to detect and treat it early.



## Jaxon Tartaglia

### Epigenetic Regulation of BRCA1 in MDA-MB-468 Breast Cancer Cells (Dr. Lissette Delgado-Cruzata)

From a young age I was very curious. I pestered my family with questions they couldn't answer and buried myself in books, finding a deep interest in anything science related. My high school biology professor made me want to pursue research when he talked about the work he did before teaching. My research at John Jay has made that goal more real, teaching me important lab skills and growing my passion to study gene expression and environmental impacts on our genetics. My work has also given me a chance to be a mentor for high school students who share my passion for science.

We study the epigenetic regulation of the gene BRCA1 by miRNAs. The functional loss of BRCA1 by mutations or through epigenetic deregulation is a very important molecular characteristic of breast tumors. Finding which miRNAs can control BRCA1 levels takes us a step closer to understanding how this disease develops.

## Microbiology

Microbiologists study the structure, function, and classification of microscopic organisms such as bacteria, fungi, and some parasites. The discipline also tries to understand how these microorganisms interact with humans and how they can cause, or protect us, from diseases. Our students are researching molecular processes in microorganisms that have the potential to help us find new cures to infectious diseases.



## Maisha Ahmed

### The Use of Transformation in *Candida albicans* to Localize Fluorescent Phb12p-Gfp Fusion Proteins (Dr. Jason Rauceo)

I discovered my love for research in my high school biology class. From discussions on CRISPR and designer babies to stem cell therapy and the ethics of obtaining stem cells, I was drawn to biological research. I knew that I would pursue my career in it. That passion for research stayed with me throughout my academic career at John Jay. Joining Dr. Rauceo's lab as part of the PRISM program allowed me to channel my passion into real research that has convinced me to pursue a PhD in biomedical research. PRISM allowed me to meet peers who are as passionate about research as I am.

Determining the location of intracellular proteins can help reveal its function. My research focuses on determining the location of prohibitin 12 (Phb12p) in *Candida albicans* by observing its location using fluorescent proteins. My research can help identify a potential target for *C. albicans* infections treatments.

## Stephanie-Marie Flowers

### Investigation of Heavy Metal-Tolerant Soil Microbes in Tree and Grass Beds Surrounding a Queens Power Plant (Dr. Regina Sullivan—Queensborough Community College)

Growing up, I was always interested in science and had a natural desire to comprehend the complexities of the world. I want to be an example of how you can use your curiosity and tenacity to overcome obstacles. My research has broadened my understanding of natural processes, from studying living organisms to chemical reactions. Engaging with PRISM exposed me to diverse scientific tools and provided hands-on experiences that deepened my passion and spurred me to explore more. I plan to pursue a career in Patent Law and to serve my community through outreach.

We are analyzing soil samples around a power plant that releases heavy metals to the environment. We look for the genetic signatures of heavy metal-tolerant bacteria to see if they are more prevalent closer to this plant. Understanding their distribution can improve the recovery from contamination and help residents' quality of life.



## TOXICOLOGY

The field of toxicology studies the adverse effects of chemical substances on living organisms and the environment. It also concerns the detection of toxins and other harmful substances, and the diagnosis and treatment of their effects.

### Environmental Toxicology

Environmental toxicology looks at how pollutants, pesticides, and some biological agents interact with the environment. PRISM students are looking at how mercury, a heavy metal that can cause severe neurological conditions in humans, is modified in the environment by physical and chemical factors that can result in this metal being present in common household products.

## Lakshmi Rao

### The Effect of Drought Versus Rainy Conditions on Mercury Emissions from Soil (Dr. Anthony Carpi)

I am a junior studying forensic science at John Jay College. I chose to study science to help me understand our world better. My goals are to develop my skills as a researcher and to gather experience and knowledge to prepare myself for a career in a laboratory. I hope that one day, my research will help my community help those that live in it. PRISM has taught me new skills that I hope I can use in the future when I design other research projects. I am grateful for the support I receive from PRISM, my mentor, and from the other undergraduate researchers in the program who offer their guidance and have taught me to become a better researcher.

I am researching the effect of water on the emission of mercury from soil samples when the frequency of watering times varies. This could determine which geographical regions are more susceptible to higher levels of mercury emissions and its influence on surrounding populations based on how often it rains.







## Andrew Vargas

### Identification of the *merA* Gene in Connecticut, Massachusetts, Pennsylvania, and New York Soil Samples (Dr. Anthony Carpi)

I am beyond happy and thankful to have been given the opportunity to conduct research at John Jay through PRISM. Just like how systems in our natural world are complex, researchers tackle questions and problems in ways that address this complexity—there is not one right way to conduct research. Through this experience I have been able to gain better time management, collaborative skills, and to push myself as an independent thinker. After my undergraduate career, I hope to continue my work as an advocate for environmental justice through the application of science.

My project aims to identify the presence of a specific gene in bacteria within soil that is responsible for the reduction of  $Mg^{2+}$  to highly volatile  $Hg^0$ . Understanding the biological mechanism in which mercury is emitted from soil aids in the remediation of sites with great exposure.

---

## Forensic Toxicology

Forensic toxicology analyzes samples for the presence of toxins and illegal drugs in cases related to the judicial and medical systems. At John Jay, our students develop more sensitive methods for drug detection in biological specimens.



## Safiyah Alghashmi

### Postmortem Analysis of Hair to Detect Cocaine and its Metabolites in Hair (Dr. Ana Pego)

As a child, I was fascinated by the scientists portrayed in movies and television shows, which initiated my passion for chemistry and biology. My research experience has taught me how to think like a scientist and it has fostered my curiosity. It taught me how to question things, and as an aspiring physician assistant, this skill will be valuable to help me help my patients. PRISM has not only provided a space to learn but also to learn from my mistakes and build from them, which to me defines what it means to be a scientist.

Our research focuses on detecting the presence of cocaine and its breakdown products in hair samples, after a subject uses cocaine. Accurate detection of metabolites prevents false positive results, which can occur through external contamination from smoke or residue.



## Rachel Calvagna

### Determination of Cortisol in Hair as a Stress Biomarker in Pregnant Women (Dr. Marta Concheiro-Guisan)

My interest in science has always been a part of me, and my junior year biology and chemistry classes in high school allowed me to flourish. I had no idea my love for chemistry would continue to grow the way it has until organic chemistry here at John Jay. Being a part of PRISM has connected me with similarly oriented peers and amazing mentors, which has made me more confident as a scientist.

Cortisol, also known as the stress-hormone, is produced by our body in response to external stimuli and stressors. I use LC-MS/MS to detect cortisol in the hair of pregnant women as a biomarker for stress. I am working to create an optimal analytical method for detecting these trace amounts of hormone.

## Rubi M. De La Rosa

### Analysis of Cocaine and its Metabolites in Post-Mortem Hair (Dr. Ana Pego)

When I was young, I never thought of becoming a scientist as a career. Science was not really my thing in high school, until I took a forensic science class during my senior year. It was different from the other sciences courses I took and becoming a forensic scientist became my goal. Since graduating from high school, I have grown to love science more and more every day, especially chemistry and biology. I got encouraged to join PRISM by a couple of my friends in the program. Joining PRISM has given me the opportunity to work besides my mentor and gain the confidence working in a lab.

Most people are not aware that cocaine and its metabolites can remain in hair follicles for a long period of time after death. Our project developed a method to extract cocaine and its derivatives from human hairs. We then use Liquid-Chromatography/Mass Spectrometry (LC-MS) to quantify them.

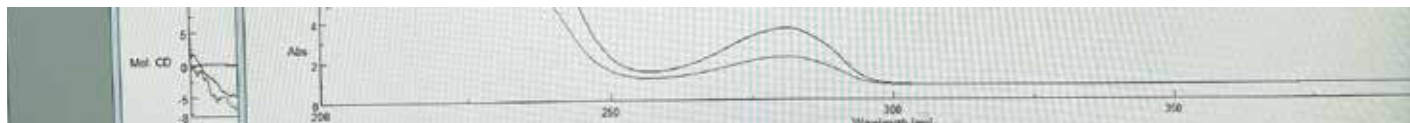
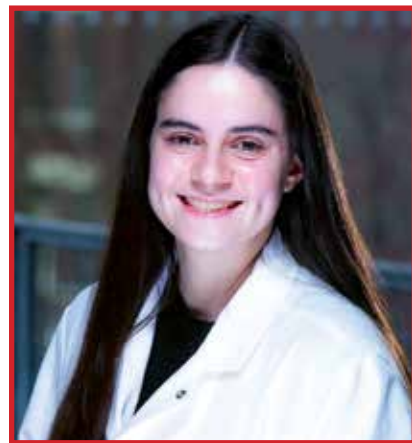


## Melissa Orr

### Development and validation of a method for the determination of 19 drugs in oral fluid (Dr. Marta Concheiro-Guisan)

Being a part of PRISM has helped me become a better scientist and has allowed me to participate in research that makes a difference. I have also been able to connect with peers from different fields and backgrounds, which has helped me shape my future. My goals after graduation are to get my PhD and to work in environmental protection.

Extracting drugs from oral fluid requires a buffer. Abbott's Quantisal™ is the most common platform used by testing companies and includes a proprietary buffer. NEOGEN® has created a new saliva collection platform with its own buffer, and we are testing its efficiency and accuracy for extracting drugs from oral fluid.



## Molecular Toxicology

Molecular toxicology studies the way that toxins work: how these toxins interact with biological molecules inside of cells and the effect of these toxins at molecular levels. PRISM students are researching how pesticides containing the heavy metal manganese affect neurons and how some psychoactive drugs are distributed throughout the body.

## John Ford

### Effect of Mitomycin C on HDAC1 Expression in MCF-7 Breast Cancer Cells and K562 Leukemia Cells (Dr. Shu-Yuan Cheng)

I am an aspiring forensic science major, where I can combine my love for science with my goals of improving the criminal justice system. Forensic science has drastically evolved within the past 20 to 30 years alongside our understanding of molecular biology and genetics. Forensic science has empowered the criminal justice system to employ precise mechanisms to right its past wrongs. I hope to improve upon that so I can bring justice for the people the system has falsely convicted and bring truth to any investigation before the law.

I study how an anti-tumor drug, Mitomycin C, affects expression of a specific epigenetic modification protein, HDAC1, in *in-vitro* models. The aim of my research is to figure out how altering the dosage of Mitomycin C can modify the expression of HDAC1, and how this in turn affects cell growth in cancerous cells. The significance of my research is to give a possible avenue to help treat cancer.





## **Aliesha Z. Hetnarine**

### **Determination of the Chemical Composition and Cytotoxicity of e-Cigarette Aerosols (Dr. Yi He)**

The process of a criminal investigation was always interesting to me, but the science behind it was more intriguing and it led to my interest in forensic science. Early on, I knew research was something I wanted to do, and joining Dr. He's lab allowed me to engage in research and discover that I aspire to pursue a PhD in forensic science or analytical chemistry. I am grateful to be part of PRISM, which has offered me the opportunity to work alongside extraordinary scientists.

The lax regulation of e-cigarettes has led to the availability of a lot of unknowns in the market. We aim to develop an analytical method to determine the chemical composition and impact of flavorants in e-cigarette aerosols. If successful, this work will lead to a better

understanding of their fundamental properties and potential toxicity.

---



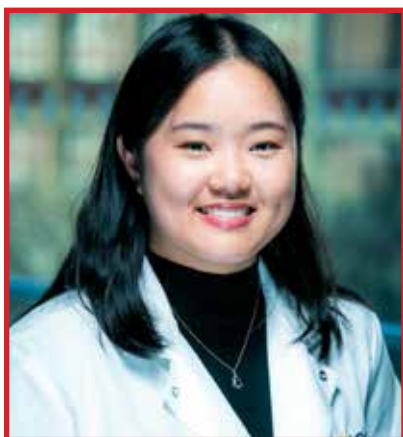
## **Ryan-Alexa Liquori**

### **Neurotoxicity of Fungicide Mancozeb in Neuronal PC12 Cells: Qiagen Ingenuity Signaling Pathway Analysis (Dr. Shu-Yuan Cheng)**

Ever since third grade, I knew pursuing science was the best career fit for me. I was fascinated with performing experiments and understanding how different disciplines in science studied the physical world. As my educational career progressed, I became interested in biology, chemistry, and the human body. I became very passionate about these subjects, and it led me to go into research. PRISM has confirmed my decision to further my education and become a pathologist's assistant to pursue my dream goals in forensic pathology. Being in PRISM has taught me to be resilient and continue to persevere, not only as a student, but as a researcher and future scientist.

My research project focuses on observing the effects the fungicide Mancozeb has on different signaling pathways in human cells to determine if neurodegenerative diseases like Alzheimer's and Parkinson's disease can result from exposure to the fungicide.

---



## **Felicia Mok**

### **Development of an e-Cigarette Liquid Components Mass Spectral Library Using Gas Chromatography-Mass Spectrometry (Dr. Yi He)**

While studying music before college, I was inspired by a former teacher revealing the science behind everything in music. From then on, I would look around wherever I was and think about the different ways an object or event could be scientifically explained. From my research experience, I have learned firsthand that science as a process takes time and that not every idea pans out. My experience as a PRISM student has allowed for a more realistic understanding of the scientific process.

Our research investigates the components in e-cigarettes and aims to build a mass spectral library of their ingredients using gas chromatography-mass spectrometry.

Knowledge of comprehensive chemical profiles in e-cigarette liquids can assist in future research and help inform consumers about the compounds that they are exposed to.



## Marina Ovanesyanyan

### Functional Assays and Proteomics of MCF7 Breast Cancer Cells Treated with a Mitomycin C Derivative (Dr. Elise Champeil)

Since I was very young, science has always been my favorite subject and I continue to be fascinated by the new advancements and discoveries in medicine and science. I aspire to become a pediatric hematologist/oncologist with both patient care and research involvement. Being in a research lab has taught me to think more critically and become more confident in executing and interpreting various scientific techniques. What I enjoy the most from being in PRISM is the opportunities! Specifically, being involved in research with professors who are experts in their field and being able to communicate our research.

Our project looks at the effect of a cancer drug on cell function. If we can determine which proteins are over or under expressed compared to the non-cancerous cells, then this data can be used in attempts to target these proteins and specifically attack cancer cells.



## Patricia St. Fleur

### Cell Cycle Regulation by Mancozeb in PC12 Cells (Dr. Shu-Yuan Cheng)

At John Jay, my goal is to immerse myself in the intricate, ever-changing world of science. I was eager to apply to PRISM, a program that offered an enriching experience that would broaden my understanding of science and its complexities. As part of this program, it has been incredibly rewarding to conduct experiments and observe the results of my research, in addition to the supportive advisors and friends I've connected with during the program. PRISM has not only widened my understanding of scientific research but also helped foster relationships that will last beyond John Jay.

My research investigates the impact of mancozeb on the cell cycle regulation of PC12 cells. This study highlights the variations in cell cycle arrest patterns based on different concentrations of Mancozeb and provides insight into Mancozeb-induced cellular toxic responses.



## ORGANIC CHEMISTRY

Organic chemists work with chemical molecules that contain carbon, the backbone of all biological substances. Organic chemistry looks specifically at the structure, reactivity, and synthesis of these molecules. Our students are developing new reagents to run environmentally friendly chemical reactions in the lab. They are also studying the chemistry of chemotherapeutic agents in the human body and developing new ways to determine the age of foods.

## Steven Bermejo

### Synthesis and Characterization of DNA Interstrand Crosslinks Formed by Mitomycins (Dr. Elise Champeil)

I have been always curious about the world around me and fascinated in problem solving from a young age. In high school I took a chemistry and forensic science class and I quickly discovered how science and the criminal justice system work together to solve crime. That's when I discovered my passion for forensic science. Since then, joining PRISM has given me the opportunity to use the knowledge I have gained in the classrooms in my research. It has given me the confidence in my technical skills to do work independently. I am grateful to have joined PRISM and for the support from my mentor and from other undergraduate researchers.

Mitomycin C is a known antitumor drug. We focus on the derivative of mitomycin C and how it targets cancer cells. We aim to synthesize a derivative of mitomycin C and crosslink them to small DNA molecules to study their effects on cancer cells. Access to DNA adducts with the derivative will provide insight to design more efficient chemotherapeutics.





## Elona Duka

### Purification and Characterization Procedures of the Products of 2-Hydroxy-1,4-Naphthoquinone and L(+)-Ornithine: Recent Advances (Dr. Gloria Proni)

My love for science truly started in high school, I took a forensics class and fell in love with the way science illuminated the hidden secrets that most people miss with a glance. This was my first encounter with the hunt for knowledge that had sparked inside me. At John Jay, PRISM has allowed me to pursue new knowledge and in turn grow my experience both in and out of the lab. My research through PRISM with my mentor has taught me how to be creative in problem solving, apply my knowledge in the real world, and has provided me with an amazing support system of peers and professors.

Our research investigates lawsone, a compound found in leaves of the henna plant, and its reaction with the amino acids found in fingerprints to develop a fluorescent fingerprinting reagent. This is done using analytical chemistry to determine the products of the reaction by color, weight, and structure to develop this new fingerprinting dye.

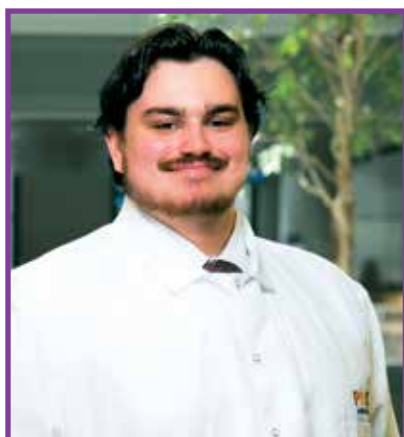


## Jayla Evans

### Quantifying the Concentration of Adenosine Triphosphate and its Derivatives in Honey Using High Performance Liquid Chromatography (Dr. Gloria Proni)

I grew up in a family with members that are part of the criminal justice system. Crime shows were always on throughout the day and stories of work were told at dinner. There was no mistaking my interest in this field, but the approach to it was the hazy part. I was always strong in math and science and in high school I discovered forensic science was ideal for my future. Here at John Jay, my love for science grew and flourished into becoming a research student. By joining PRISM, I have been able to meet such great companions as well as professors that believe in my work ethic and help guide me into my next adventures.

Our research involves everyone's favorite sweetener, honey. Honey is generally known to never expire, but we are here to challenge that. We are comparing two methods of extracting adenosine triphosphate (ATP), a nucleic acid present in all living things, as well as its breakdown products from honey to calculate the honey's age.



## Nicholas Fraschilla-Brodkin

### Purification and Characterization Procedures of the Products of 2-hydroxy-1,4-naphthoquinone and Arginine (Dr. Gloria Proni)

Science has always been fascinating to me. Curiosity for why certain things happen in the world quickly blossomed into a love for organic chemistry. My research has taught me what benchwork in the lab is really like, which helped me realize the importance of staying organized and focused while still being efficient. Performing research in our lab prepared for my pursuit of obtaining my Ph.D. Working with Dr. Proni in the lab furthered my knowledge and taught me how rewarding research can be.

Recent research has shown that lawsone, an extract from the henna plant, interacts with basic amino acid residues found on fingertips and produces fingerprints with fluorescent properties. My goal is to synthesize, separate, and characterize the products in the reaction

between lawsone and arginine.

## Danny Jamoul

### Purification and Characterization Procedures of the Products of 2-Hydroxy-1,4-Naphthoquinone and Basic Amino Acids (Dr. Gloria Proni)

I have always been interested in understanding the microscale level world, and its effects on our macroscale environment. Doing research under Dr. Proni allowed me to apply the knowledge I have gained in class and in the laboratory to increase my detective-reasoning skills, and to use my imagination to get results. It showed how vital cooperation and teamwork are to get the job done and allowed me to be a better scientist. After John Jay, I plan to obtain an MD/PhD in neurology. Being part of PRISM has increased my research skills in applying and innovating while also connecting me with like-minded individuals and new lifetime friends.



Our work looks at how lawsone, a pigment derived from henna, reacts with various amino acids found typically in sweat to develop a new finger-printing reagent. The analysis is done using analytical chemistry methods to understand the different products formed, their structure, and their colors.

## Camila Marino

### Earth Abundant Metals to Anticancer Drugs (Dr. Guoqi Zhang)

My career goal is to become a forensic toxicologist and further my education by obtaining a master's in forensic science. Performing undergraduate research helped me gain more knowledge within a lab setting and joining PRISM allowed me to be more social and comfortable around my peers.

Coordination compounds can play a role in cell death when interacting with the DNA of cancer cells. Our research deals with the discovery of anticancer activity of various coordination compounds that can be used in chemotherapy and immunotherapy treatments for tumor causing-cancers.



## Sarah Marks

### Synthesis of Oligonucleotides Containing DNA Adducts from a Novel Mitomycin C Derivative, DELS-15 (Dr. Elise Champeil)

Growing up, I was raised on science. My dad majored in chemistry and taught me and my friends nerdy chemistry jokes. I love problem solving and working on puzzles. I knew I wanted to be in the criminal justice system, but I continued to gravitate toward chemistry. Exploring research at John Jay has secured my interest in obtaining a PhD in chemistry. Doing research has taught me how to think independently and learn from my errors. Working with my mentor has allowed me to gain confidence in myself as a researcher and understand that making mistakes is natural and often necessary to learn..

DELS-15 is a novel anti-tumor drug, a derivative of mitomycin C. We are working on the synthesis of DELS-15 interstrand crosslinks, toxic DNA lesions, to understand how DELS-15 could be toxic to cancer cells. Discovering new and effective anti-cancer treatment is our goal.



## Quan Khanh Tang

### The Application of Metal Organic Coordination Complexes in Treating Breast Cancer (Dr. Guoqi Zhang and Dr. Shu-Yuan Cheng)

As a curious person, I'm always interested in science topics. I have expanded my perspective on science since I started research with my mentors, who are experts in my field and always help me understand the scientific process. My career goal is to pursue an MD/PhD degree because I want to use the knowledge I have gained from my research to ensure my understanding of medical concepts. PRISM is not only an organization for people who want to participate in science, but it is also a place that teaches me how to be successful and achieve my goals.



My project focuses on synthesizing metal-organic coordination complexes and using X-ray crystallography to determine the structure of the synthetic compounds. Later, these metal complexes will be evaluated for cytotoxicity to determine whether they are the proper drug treatment for breast cancer.



## Nora Zadori

### The Design of Novel Metal-Based Anticancer Drugs with Terpyridine Ligands (Dr. Guoqi Zhang)

I went into science because I wanted to know how the world works. I love to see things happening right in front of me because it allows me to come up with ideas to explain what I am observing. Research has allowed me to build upon the knowledge I gained in class by applying that knowledge to the observations of my experiments. I also love working with my peers and collaborating on what we should do next. This collaboration allows me to be more comfortable with my own voice and to not fear new experiences, which showed me that I am capable of continuing my education by pursuing a master's degree in toxicology or forensic science.

A ligand is a molecule that binds to a metallic element. In the lab we can purify these ligand-metallic complexes by crystallizing them using various methods. If a crystal forms, we can analyze the structure and determine if it is a good candidate for toxicity experiments.

# COMPUTER SCIENCE AND SOFTWARE DEVELOPMENT

From smart phones to the “internet of things,” technology plays a critical role in our lives. At John Jay, our students are improving the safety of computer networks, understanding how social networks impact our day to day lives, and developing new ways to use smart technology in our everyday lives.

## Pete Ayala

### The Emergence of Neologisms on Social Networks (Dr. Hunter Johnson)

I am fascinated by the emergence of newly coined words or phrases, also known as neologisms, particularly those that quickly surge in popularity and fade rapidly. This interest was first sparked during the pandemic, a time when the dynamics of disease transmission were widely discussed, leading me to draw a parallel between the spread of diseases and the propagation of linguistic trends. I think of neologisms as ideas spreading through networks, and I am focusing on connections and openness to new words. My academic ambition is to pursue a PhD in Computer Science, with a focus on the dynamics of social networks..

Our work explores the lifecycle of neologisms using graph neural networks inspired NIH’s disease models. By simulating their diffusion and analyzing their interactions, we aim to predict their popularity in social networks, enhancing our understanding of how new words gain acceptance.



# SCIENTIFIC COMMUNICATION AND EDUCATION

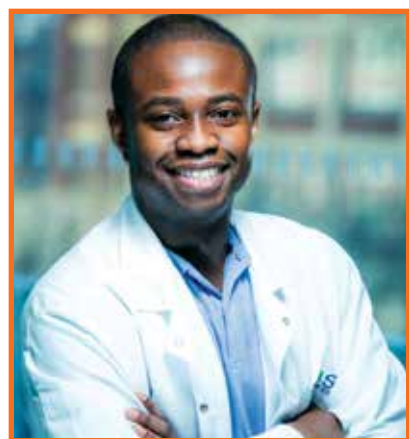
It has never been more important for scientists to develop new ways to communicate their disciplines to the masses and to improve the ways we teach science. An informed populace makes better decisions, lives longer, and can lead better lives. At John Jay, our students and faculty are taking novel approaches to the teaching of physics to undergraduate students.

## Aston Simpson

### Physics Field Trading Card Game (Dr. Daniel Yaverbaum)

I was intrigued by science after participating in science fairs, live demonstrations in labs, and field trips. Science, curiosity, and persistence drive technological advancements in this world. I plan on pursuing this curiosity throughout my career by further advancing forensic science. PRISM offered me the freedom to select my research mentor and project and is very supportive of us, guiding us towards possible future careers through different events offered in the school year.

Non-traditional and alternative teaching outside of the classroom can be used to target different learning styles and to explain hard concepts. My research is focused on creating a trading card game to introduce physics concepts. Our future goal is to focus on the other STEM fields and inspire future scientists.



## Briana Vanegas

### Physics Field Trading Card Game (Dr. Daniel Yaverbaum)

I have always gravitated towards the sciences– there has always been a curiosity within me for the world around us, why we’re here, and what my personal purpose is here on Earth. I think I sought out a field where I knew I could help answer those questions. The scientific/ investigative method comes very naturally to me, and I feel honored to develop the skill set to thrive in this field. Having access to such comprehensive STEM education is a privilege, and I am an advocate for accessibility of such curricula to future scientists.

We aim to make heavy STEM subjects like physics more digestible with our trading card game, which models real-life physics concepts and phenomena. Kids in school will have the potential to contribute to great scientific findings in the future, and we aim to foster and facilitate that.





# PUBLICATIONS AND PRESENTATIONS

**IN ADDITION TO OUR** Annual Symposium, PRISM students regularly present their research to their peers on CUNY campuses and at scientific conferences and

professional events. Below are a few of the many professional accomplishments our student researchers achieved this past academic year.

## Publications

Concheiro, Marta, Steven Towler\*, Joshua S. Elmore, Michael R. Chojnacki, Teeshavi Acosta\*, Masaki Suzuki, Kenner C. Rice, and Michael H. Baumann. "Brain Concentrations of MDPV and its Metabolites in Male Rats: Relationship to Pharmacodynamic Effects." *Current Pharmaceutical Design* 28, no. 32 (2022): 2653-2663.

Conrad, Karen A.\*, Hyunjeong Kim\*, Mohammad Qasim, Amel Djehal, Aaron D. Hernday, Laurent Désaubry, and Jason M. Rauceo. "Triazine-based small molecules: a potential new class of compounds in the antifungal toolbox." *Pathogens* 12, no. 1 (2023): 126.

Lents, Nathan H., and Richard T. Piszczatowski\*. "Cyclins, Cyclin-Dependent Kinases, and CDK Inhibitors." Essay. In *Encyclopedia of Cell Biology* 5, edited by Bradshaw RA, Hart GW, and Stahl PD. 2nd ed., 5:224-34. Waltham, MA: Academic Press, 2023.

Obaidat, Muath A., and Joseph Brown\*. "Perspectives of Blockchain in Cybersecurity: Applications and Future Developments." In *Research Anthology on Convergence of Blockchain, Internet of Things, and Security*, edited by Information Resources Management Association, 818-840. Hershey, PA: IGI Global, 2023.

Towler Steven\*, Marta Concheiro-Guisan. "Target Analysis of Phenethylamines, Tryptamines, and Piperazines in Blood and Urine. Chapter 3." In *Methods for Novel Psychoactive Substance Analysis*, edited by Concheiro M., Scheidweiler K. Humana Press, Springer Nature, 2023.

Vee, Samantha\*, Gerald Barclay, and Nathan H. Lents. "The glow of the night: The tapetum lucidum as a co-adaptation for the inverted retina." *BioEssays* 44, no. 10, 2022.

## Conferences

Acosta Teeshavi\*, Natalie Fernandez, Viviana Chavez\*, Kate Good, Marta Concheiro-Guisan. "Determination of Pharmaceuticals and Drugs of Abuse in New York/New Jersey Harbor Estuary Water." *Society of Forensic Toxicologists Meeting*, October 31-November 4, 2022.

Aguilar, Daniel\*, Christina Fernandez\*, Garry Milman, Marta Concheiro-Guisan. "Comparison of Hydrolyzing Efficiency and Performance of Four Synthetic  $\beta$ -glucuronidase Enzymes for the Detection of Opioids in Urine Samples via LC-MS/MS." 2023 CSTEP Statewide Student Annual Conference, April 14-15, 2023.

Aguilar, Daniel\*, Isaiah Jewel, Garry Milman, Marta Concheiro-Guisan. "Comparison of Hydrolyzing Efficiency and Performance of Two Rapid Enzymes for the Detection of Benzodiazepines in Urine Samples by LC-MS/MS." *The 2022 SACNAS National Diversity in STEM Conference*, October 27-29, 2022.

Ates, Selin, Camila Marino, Quan Tang, Nora Zadori, Guoqi Zhang. "The Design of Anticancer Drugs with Earth Abundant Metals." *City University of New York's Undergraduate Celebration Day*, May 31, 2022

Chavez, Viviana\*, Natalie Fernandez, Marta Concheiro-Guisan. "Analytical Method for the Determination of Pharmaceuticals and Drugs of Abuse in River Water." *The 2022 SACNAS National Diversity in STEM Conference*, October 27-29, 2022.

De La Cruz Baez, Suleidy\*, Genesis Echavarría, and Mechthild Prinz. "The Battle of the DNA Bots: Evaluating Automated DNA Extraction for Forensic Casework." 2023 CSTEP Statewide Student Annual Conference, April 14-15, 2023.

Delgado-Cruzata, Lissette, Milena Rodriguez Alvarez, Veronika Zenkeviciute\*, Nickolas Almodovar\*, and Toni-Ann Bravo. "Identifying MicroRNAs Associated with Neuropathic Pain in Patients with Rheumatoid Arthritis (RA)." *ACR Convergence* 2022, November 10-14, 2022.

Diaz, Jhoanna\*, Flavia Carvalho, and Lissette Delgado-Cruzata. "Exploring the associations of triple negative breast cancer and race in Brazilian women." *Annual Biomedical Conference for Minority Scientists* 2022, November 9-12, 2022.

Gonzalez, Gabriel\*, Nathan Lents. "Use of Bioinformatics to Distinguish *H. sapiens*, *H. denisova*, and *H. neanderthalensis* through the lens of miRNA." *The 2022 SACNAS National Diversity in STEM Conference*, October 27-29, 2022.

Jenkins, Brianna\*, Jennifer G. Vieira, Diego J. Gomes de Paula, Leonor Gusmão, Lissette Delgado-Cruzata. "Studying genetic ancestry in breast cancer patients with triple negative breast cancer." *Annual Biomedical Conference for Minority Scientists* 2022, November 9-12, 2022.

Jenkins, Brianna\*, Lissette Delgado-Cruzata. "African Genetic Ancestry and the Slave Trade in Brazilian Women with Triple Negative Breast Cancer." 2023 CSTEP Statewide Student Annual Conference, April 14-15, 2023.

Kim, Hyunjeong\*, Conrad, Karen A\*, and Jason Rauceo. "Antifungal Properties of the Triazine-Derived Compound Me156." *American Society of Microbiology (ASM) Microbe* 2023 Conference, June 15-19, 2023.

Nuñez, Kimberly\*, Darrien Maynard\*, Anthony Carpi. "A Biological Mechanism for the Reduction and Emission of Mercury from Soil." *The 2022 SACNAS National Diversity in STEM Conference*, October 27-29, 2022.

Rosas, Melissa\*, Owen Zacarias\*, Elise Champeil, Shu-Yuan Cheng. "Potential signaling regulations of stereoisomeric DNA interstrand crosslinks produced by mitomycins in MCF7 cells." *The 2022 SACNAS National Diversity in STEM Conference*, October 27-29, 2022.

Rosas, Melissa\*, Owen Zacarias\*, Elise Champeil, Shu-Yuan Cheng. "Identification of Potential Cellular Responses Triggered by Stereoisomeric DNA Interstrand Crosslinks Produced by Mitomycins in MCF-7 Cells." *American Society for Biochemistry and Molecular Biology*, April 2-5, 2023.

St. Fleur, Patricia\*, Alexandra Drombroski, Marialejandra Faure Betancourt\*, Alexis Alvarado, Ana Miguel Fonseca Pego. "The Washing of(f) Cocaine to Prevent False Positive." *City University of New York's Undergraduate Celebration Day*, May 31, 2022

Tetrault, Hannah\*, Shu-Yuan Cheng. "The Effect of Mitomycin C and its Analog on Cell Cycle Arrest." *The 2022 SACNAS National Diversity in STEM Conference*, October 27-29, 2022.

Veronika Zenkeviciute\*, John François\*, Milena Rodriguez Alvarez, Lissette Delgado-Cruzata. "Identification of miRNAs associated with neuropathic pain in Hispanic patients with rheumatoid arthritis" *The 2022 SACNAS National Diversity in STEM Conference*, October 27-29, 2022.

**\*Denotes PRISM student or alumnus.**



# 2024 PRISM SYMPOSIUM

**ESTABLISHED FORMALLY IN 2006**, but building on the foundations of a program that began as early as 2000, the Program for Research Initiatives in Science and Math (PRISM) strives to promote research achievement among John Jay students and prepare them for professional careers as scientists. By establishing and supporting close mentoring relationships between students and faculty, PRISM embraces the apprenticeship model of science.

The Program not only seeks to train students in the language of science, but to immerse them in its practice. Students participate in all aspects of scientific exploration, from

the formation of research questions to the presentation and publication of new research studies. Along the way, they learn from their successes, and they learn to appreciate their failures. Exposed to the culture of the scientific community, many students find themselves irresistibly drawn to the profession. To date, more than 150 students have moved on from PRISM to post-graduate training in the sciences, a path that will lead to them becoming scientists themselves.

The Annual Research Symposium is a celebration of this year's student researchers and the work that they have accomplished over the past academic year.

## 2024 PRISM Keynote Speaker: **Dr. Shawn Williams**



**DR. SHAWN WILLIAMS** was a PRISM undergraduate researcher from 2013 to 2015. Under the mentorship of Dr. Artem Domashevskiy, Dr. Williams examined how the pokeweed antiviral protein (PAP) binds the genetic material of various RNA viruses. Pokeweed (*Phytolacca americana*) is a poisonous, herbaceous perennial plant native to Eastern North America. PAP serves as pokeweed's main defense against RNA viruses that can infect this plant, binding to the viral genetic material. Once bound, it catalyzes chemical modifications that inactivate the virus. PAP's RNA binding is promiscuous, recognizing motifs commonly present in many viral RNAs and giving it broad spectrum antiviral properties, including against human and other animal viruses. Dr. Domashevskiy's lab looked at how to take advantage of phenomenon

to develop anti-viral proteins for human RNA viruses like Herpes and HIV. While at John Jay, Dr. Williams minored in mathematics and worked in retail security to help support his education.

In 2015, after graduating from John Jay with a Bachelor of Science degree in forensic science and a concentration in molecular biology, Dr. Williams began his doctoral studies at Brown University in Providence, RI. At Brown, Dr. Williams worked on his dissertation with his advisor Dr. David Rand in the Department of Molecular Biology, Cell Biology, and Biochemistry. His dissertation focused on how networks of genes work together to control our metabolism and their impact on neurological health. Specifically, he demonstrated that a gene class associated with neurodegenerative diseases in humans also regulates sugar metabolism in fruit flies, a common animal model used to study neurobiology and genetics due to its similarity to humans. His work also demonstrated that some therapies for diabetes are effective at slowing neurodegeneration in this model, suggesting that these drugs could be repurposed to treat certain neurodegenerative diseases in humans.

During his training, Dr. Williams earned several awards and honors including Brown's John G. Peterson Fellowship, the Howard Hughes Medical Institute Gilliam Fellowship, the National Institute of Health Initiative to Maximize Student Development Fellowship and an honorable mention from the National Science Foundation Graduate Research Fellowship

Currently, Dr. Williams is a Consultant at the Boston Consulting Group, one of the world's three largest management consulting firms. His portfolio there has included pharmaceutical marketing and regulatory improvements, formulation of strategies to develop local next-generation genomic sequencing capabilities for government agencies, and product performance evaluation for medical devices, among others. At the Symposium, Dr. Williams will discuss how his John Jay experiences have influenced his professional path and his journey to graduate school. He will discuss his research, his current work, and how to overcome fears that might limit your professional aspirations and ambitions.

# 2024 PRISM Outstanding Undergraduate Researcher

## 2024 PRISM Outstanding Undergraduate Researcher: Rachel Calvagna

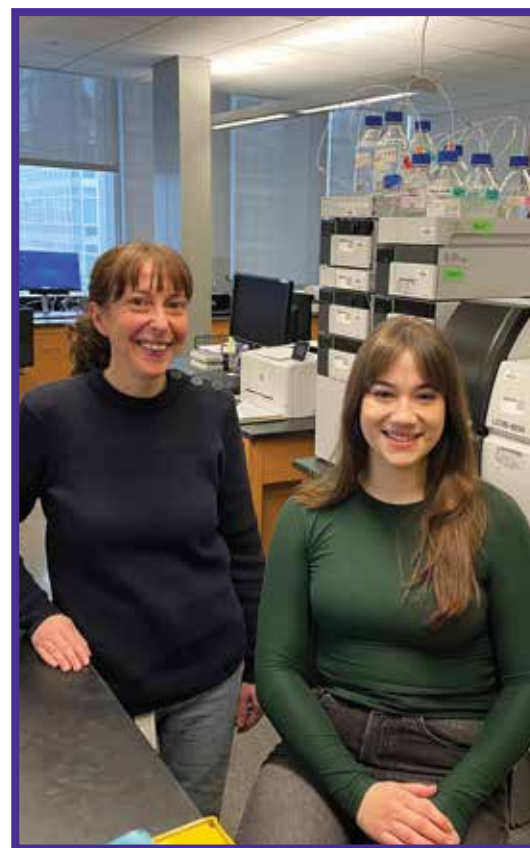
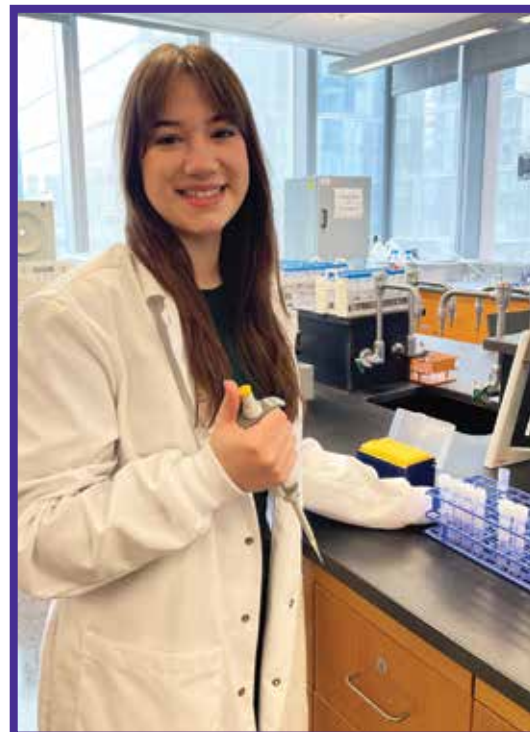
This year, Ms. Rachel Calvagna has been selected as PRISM's Outstanding Undergraduate Researcher. This award recognizes the exceptional progress and commitment to research displayed by one of our students, and their development as a scientist.

Rachel joined John Jay as a freshman student in the fall of 2020. She majored in Forensic Science, with a concentration in toxicology. She was selected to be one of our Undergraduate Researchers during the spring of 2022. Prior to that, she was already working under the mentorship of Dr. Marta Concheiro-Guisan. Their research project in forensic toxicology aims to develop methods to detect cortisol in hair samples. Cortisol is known as “the stress hormone.” It is normally released in a diurnal cycle by the adrenal glands (two small glands that sit right above our kidneys) and at higher concentrations in response to stress and low-blood sugar. Because the concentration of cortisol in our bodies varies over time and because it can accumulate in hair as it grows, it provides a potential matrix to do a retrospective evaluation of chronic stress. The overall goal of their project is to measure the concentration of cortisol in hair from pregnant women and compare it to socioeconomic factors and other variables that can affect the health of the mother and clinical outcomes of pregnancies (learn more about Rachel's work in page 16).

In her nomination letter, Dr. Concheiro-Guisan noted that “Rachel is an outstanding student, a gifted researcher, and an exceptional mentor. I believe these accomplishments make her a great candidate for this prestigious award.” She continues “she is able to foresee the experiment, predict the outcomes, and troubleshoot... Rachel has a researcher mind set, always thinking the reason why and coming up with news ways of how to improve the experiments. She is really exceptional.”

Rachel is completing her undergraduate degree this spring and continues to work in Dr. Concheiro-Guisan's lab. She found out about our Undergraduate Research Program on a classroom visit, and immediately applied. During her time at John Jay Rachel has worked as an adjunct College Lab Technician for various classes and attended a program at the Museum of Modern Art on the intersection of science and art conservation. With plans to attend graduate programs in toxicology after John Jay, she mentored several College Now high school students in her lab, who presented their work at the American Museum of Natural History. She also joined the CUNY Inclusive Economy Initiative at John Jay to gain more hands-on skills. These experiences have motivated her to pursue this dream and she has been accepted to a master's degree program in environmental toxicology at New York University.

The PRISM Outstanding Undergraduate Researcher Selection Committee evaluates nominees based on their research mentors' nomination letters, as well as their current research progress. Reaching a decision is never a simple task as all nominees demonstrate outstanding research skills. In addition, each mentor submits a nomination letter that is not only impressive but also heartfelt, highlighting the close working relationship between mentor and student.





**Top Left:** PRISM URP class of 2023. **Top right:** 2023 Keynote Speaker Dr. Shanelle Shillingford. **Bottom:** PRISM URP students at the 2023 PRISM Symposium.

## Former PRISM Symposium Speakers and Outstanding Undergraduate Researcher Award Recipients

### 2023

Keynote: Shanelle Shillingford, PhD (Yale University)

*John Jay class of 2016*

Award Recipient: Kimberly Nuñez, currently at University College Cork

### 2022

Keynote: Lauren Weidner, PhD (Rutgers University)

*John Jay class of 2010*

Award Recipient: Christina Gonzalez, currently at John Jay College

### 2021

Keynote: Eugene Gonzalez-Lopez, PhD (Penn State University School of Medicine)

*John Jay classes of 2012 (BS) and 2014 (MS)*

Award Recipient: The Entire Class of 2021

### 2020

Keynote: Olivia R. Orta, PhD (Harvard University)

*John Jay Class of 2007*

Award Recipient: Alejandro Ocampo, currently at John Jay College

### 2019

Keynote: Roselynn Cordero, PhD (Cornell University)

*John Jay Class of 2012*

Award Recipient: Marienela Heredia, currently at University of Wisconsin at Madison

### 2018

Keynote: Zuleyma Peralta, PhD (Icahn School of Medicine at Mount Sinai)

*John Jay Class of 2009*

Award Recipient: Lisset A. Duran, currently at Princeton University

### 2017

Keynote: Christopher Pedigo, PhD (Yale School of Medicine)

*John Jay Class of 2009*

Award Recipient: Ronal Peralta, currently at University of Pittsburgh School of Medicine

### 2016

Keynote: Anastasiya Yermakova, PhD (University at Albany's School of Public Health)

*John Jay Class of 2008*

Award Recipient: David Rodriguez, currently at BASF

### 2015

Keynote: Daniel Cocris, DMD (Rutgers School of Dental Medicine)

*John Jay Class of 2006*

Award Recipient: Yessenia Lopez, currently at Weill Cornell Graduate School of Medical Sciences

### 2014

Keynote: Alison Keenan, PhD (University of CA-Davis)

*John Jay Class of 2007*

Award Recipient: Eugenia Salcedo, PhD, currently at IAVI

### 2013

Keynote: Lisa DeWald, PhD (Stony Brook University)

*John Jay Class of 2004*

Award Recipient: Anna Stoll, currently at Michigan State University

### 2012

Keynote: Damon Borg, PhD (St. John's University)

*John Jay Class of 2005*

Award Recipient: Roselynn Cordero, PhD, currently at 3M

### 2011

Keynote: Kimberly Papadantonakis, PhD (California Institute of Technology)

*John Jay Class of 2002*

Award Recipient: Richard Piszczatowski, currently at Albert Einstein College of Medicine

### 2010

Keynote: Julie Layscock, PhD (Oregon State University)

*John Jay Class of 2005*

Award Recipient: Jason Quiñones, PhD, currently at Synchrogenix, a Certara company

### 2009

Keynote: Bladimir Ovando, PhD (SUNY—Buffalo)

*John Jay Class of 2002*

Award Recipient: Kana Noro

### 2008

Keynote: Marcel Roberts, PhD (Boston College)

*John Jay Class of 2002*

Award Recipient: Nicole DeLuca



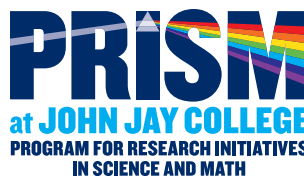
# RESEARCH MENTORS

Faculty Member	Area of Expertise
Aftab Ahmad, DSc	Object-oriented programming, computer architecture, and data communications
Anthony Carpi, PhD	Environmental chemistry and science education
Leslie Chandrakantha, PhD	Statistics, regression analysis and logistic regression, time series analysis, and computer simulation
Elise Champeil, PhD	Synthetic chemistry and bioorganic chemistry
Shu-Yuan Cheng, PhD	Toxicology, pharmacology, molecular biology, and neuroscience
Marta Concheiro-Guisan, PhD	Forensic and clinical toxicology
Angelique Corthals, PhD	Pathology, biomedical and physical anthropology, and archeology
Lisette Delgado-Cruzata, PhD, MPH	Epigenetics and cancer epidemiology
Peter Diaczuk, PhD	Ballistics, trace analysis, blood splatter, image analysis, and evidence examination.
Artem Domashevskiy, PhD	Biochemistry, biophysics, and molecular biology
Sam Graff, PhD	Computer Science
Yi He, PhD	Analytical chemistry and environmental sciences
Shweta Jain, PhD	Wireless and social networks and delay tolerant networks
Hunter Johnson, PhD	Mathematical logic
Ekaterina Korobkova, PhD	Biochemistry, biophysics, and physical chemistry
Thomas Kubic, JD, PhD	Light and electron microscopy, vibrational spectroscopy, and image analysis
Nathan Lents, PhD	Cell biology, forensic biology, genetics, and bioinformatics
Richard Li, PhD	Forensic DNA analysis, forensic molecular biology, and forensic genetics
Yi Li, PhD	Applied mathematics, nonlinear elliptic and parabolic differential equations
Fatma Najar, PhD	Machine learning applications, human-computer interaction, and natural language processing
Mauth Obaidat, PhD	Computer and mobile networks, wireless and mobile security, IoT security and privacy
Ana Pego, PhD	Forensic, <i>postmortem</i> , and analytic toxicology.
Mechthild Prinz, PhD	Forensic biology and forensic genetics
Gloria Proni, PhD	Supramolecular and molecular chirality, optical spectroscopy, and organic synthesis
Jason Rauceo, PhD	Molecular biology, molecular genetics, and mycology
Jennifer Rosati, PhD	Forensic entomology, biology, ecology, entomotoxicology, and insect behavior
Daniel Yaverbaum, MS, MPhil	Physics education and cognition, Galilean and special relativity, and astronomy
Guoqi Zhang, PhD	Inorganic/organometallic chemistry, chemical catalysis, and metallic anticancer drugs

For an up-to-date list of our Faculty Mentors,  
scan this QR code.



# PROGRAM INFORMATION AND STAFF



**Anthony Carpi, PhD**  
*Director &  
John Jay's Dean of Research*



**Edgardo Sanabria-Valentín, PhD**  
*Associate Director &  
Pre-Professional Advisor*



**Rachel Perlman, PhD**  
*Senior Grant Program Manager*

## PROGRAM FOR RESEARCH INITIATIVES IN SCIENCE AND MATH (PRISM)

groups various initiatives aimed to support science and math students at John Jay College. The PRISM Undergraduate Research Program provides students with the opportunity to engage in long-term, close mentoring relationships with faculty who provide training, personal and career advisement, and professional encouragement. Our newest initiative, the STEM Scholars Program, offers academic advisement, tutoring, and professional development activities to an additional 100+ science and math students per year. In addition, we support the CUNY Justice Academy (CJA), a series of articulation agreements with partner CUNY Community Colleges, by providing academic advisement and outreach activities to CJA students transitioning to our forensic science major.

By building a relationship between the students and John Jay, PRISM has significantly reduced attrition from STEM majors and helps underserved students to see themselves as scientists, rather than outsiders in the discipline. The program relies on these relationships, as well as peer cohort building and professional development to engage students in science and prepare them for success in science careers. Importantly, it does this in an environment that explicitly considers the backgrounds of the underserved populations that participate.

Since its founding in 2006, almost 375 students have participated in PRISM, of whom more than 99% graduate. More than 150 students have moved on to post-graduate programs, almost half from underrepresented minority groups and the majority of whom are women. And 75 PRISM students have gained admission into doctoral programs in STEM fields, half of whom come from underrepresented groups. PRISM has been recognized by CUNY, the National Science Foundation, and the National Academy of Sciences, and *Excelencia* in Education as a model of excellence for improving diversity in the STEM pipeline.

For more information about PRISM and our incredible students, visit:

[www.jjay.cuny.edu/PRISM](http://www.jjay.cuny.edu/PRISM)

Follow us on Twitter and Instagram @JJCRISM



**Alejandra Myerston, MS**  
*STEM Retention Specialist*



**Patricia Samperi, MS**  
*Executive Assistant &  
Grant Support Specialist*



**Derek Casarrabias**  
*Academic Advisor &  
Program Specialist*



**Oscar Cifuentes**  
*Project Assistant*

# ACKNOWLEDGEMENTS

## Funding for PRISM and student research mentoring is provided by a number of federal and state sources, which we gratefully acknowledge:

- New York State Education Department Grant for Collegiate Science and Technology Entry Program (CSTEP) (Award #: 0537232003).
- United States Department of Education Title V Institutional Development of Hispanic Serving Institutions Grant (Award #: P031S200200).
- United States Department of Education Title III—Part F Hispanic Serving Institutions—Science, Technology, Engineering, and Mathematics (HSI-STEM) and Articulation Programs Grant (Award #: P031C210098).
- National Science Foundation Improving Undergraduate STEM Education: Hispanic-Serving Institutions (HSI) Grant (Award #: 2115960).
- Dormitory Authority of the State of New York's Graduate Research Technology Initiative

PRISM is sponsored by external grants, and by the philanthropic support of generous individuals.

To support and partner with PRISM, scan this QR code with your smartphone or visit:

<http://www.jjay.cuny.edu/support-prism>

Follow us on Twitter and Instagram @JJCPRISM



### Image Credits:

Ari Pap Studios © page 28.

JJC Students and graduates: Selin Ates © cover; Nora Zadori © page 4; Selin Ates © page 7, bottom right; Diana Muñoz Ortiz © page 9; Selin Ates © page 19; Quan Tang © page 22; Shawn Williams © Page 26.

JJC Faculty: Jeniffer Rosati © page 10.

Museum of Modern Art © page 7, bottom left.

Shutterstock © pages 8, 11, 12, 13, 15, 16, 18, 21, 22, 23.

All other photos © PRISM or John Jay College of Criminal Justice.



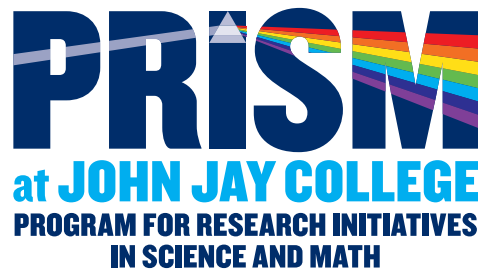


choose your future

challenge yourself

investigate

engage



network

inquire

examine

build connections

question

choose your future

Production of the PRISM *Chronicle* was funded through grants from the US Department of Education (HSI-STEM) and The NYS Education Department (CSTEP).

For information about the Program for Research Initiatives in Math and Science, please email the staff at [PRISM@jjay.cuny.edu](mailto:PRISM@jjay.cuny.edu) or visit [www.jjay.cuny.edu/PRISM](http://www.jjay.cuny.edu/PRISM)

To learn more about  
**PRISM**  
at **JOHN JAY COLLEGE**

or to apply to our programs,  
scan the QR code below!



To scan, just point your  
smartphone camera at the QR code, or visit  
[www.jjay.cuny.edu/PRISM](http://www.jjay.cuny.edu/PRISM)

