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

Undergraduate Research CHRONICLE

2020

choose your future

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PRISM

at JOHN JAY COLLEGE

PROGRAM FOR RESEARCH INITIATIVES IN SCIENCE AND MATH

network

inquire

examine

build connections

question

choose your future

Cover Shot:
Microscopic view of a diatom, a single-celled algae. Diatoms are often used in forensic investigations to determine if the victim's cause of death was drowning.

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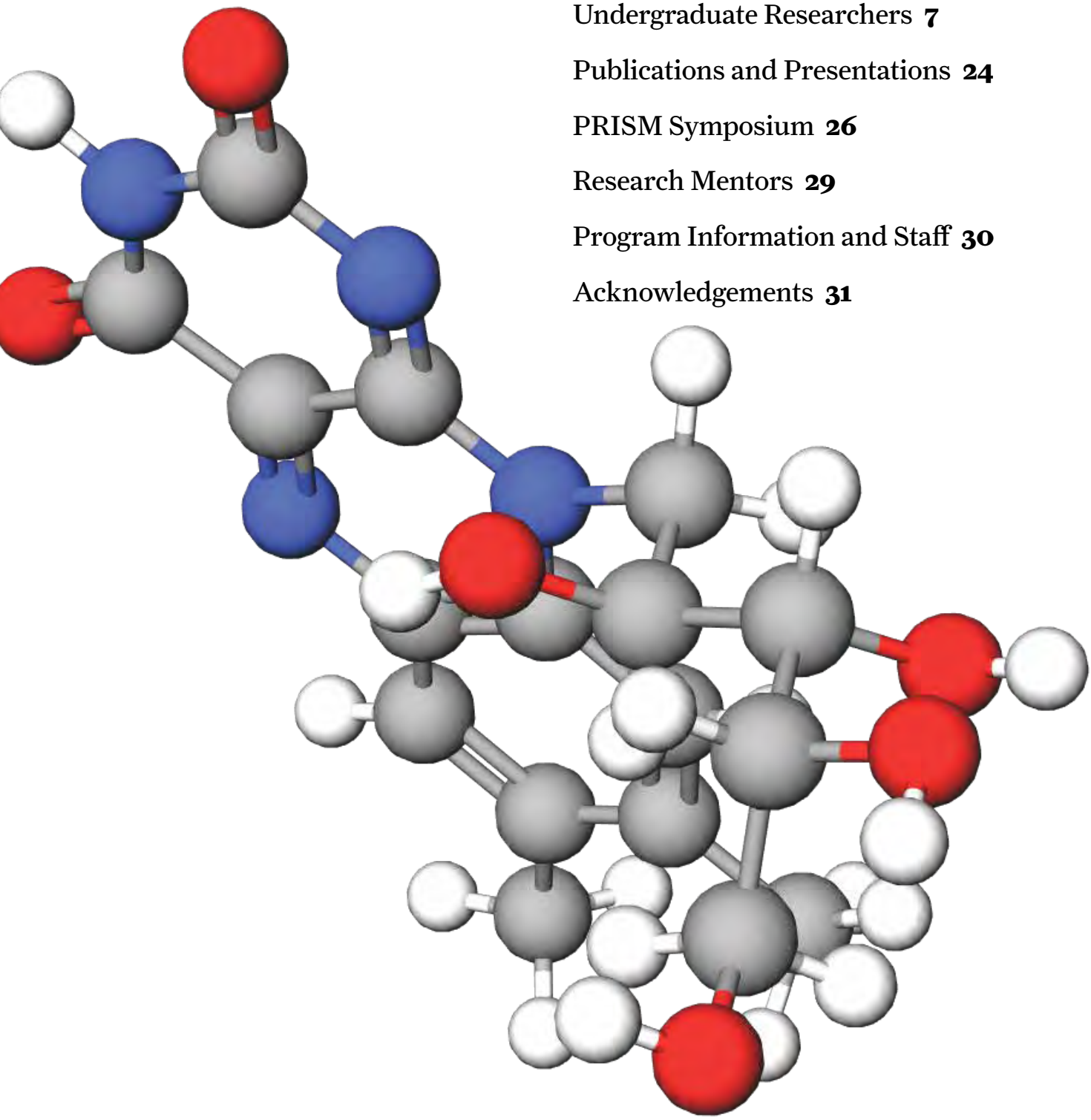

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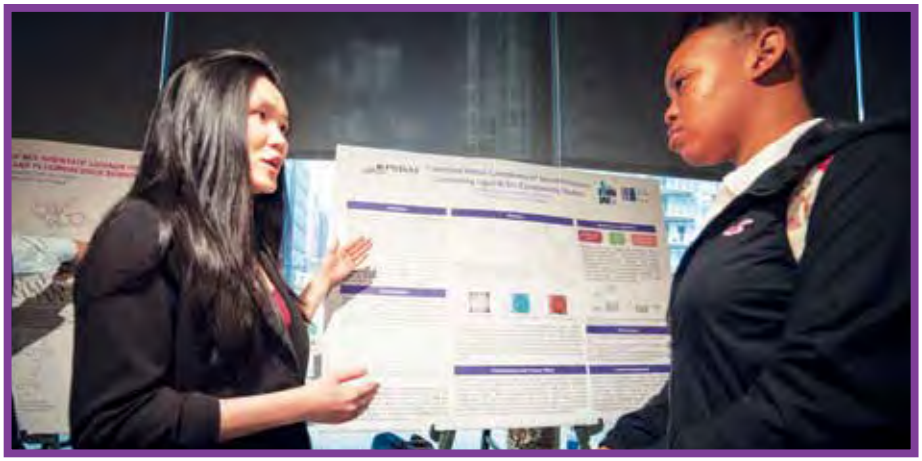

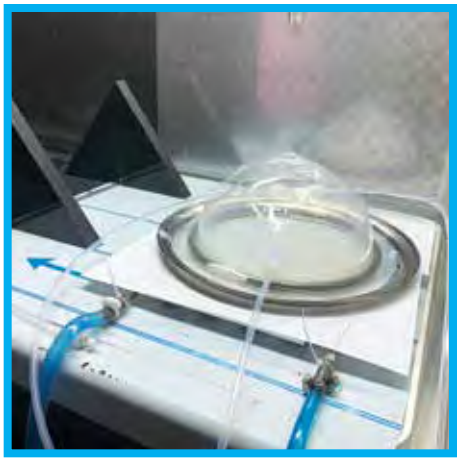

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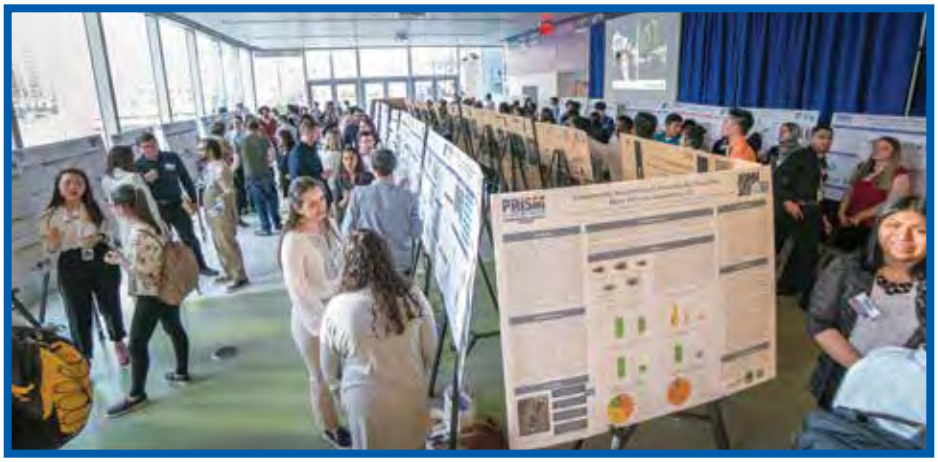
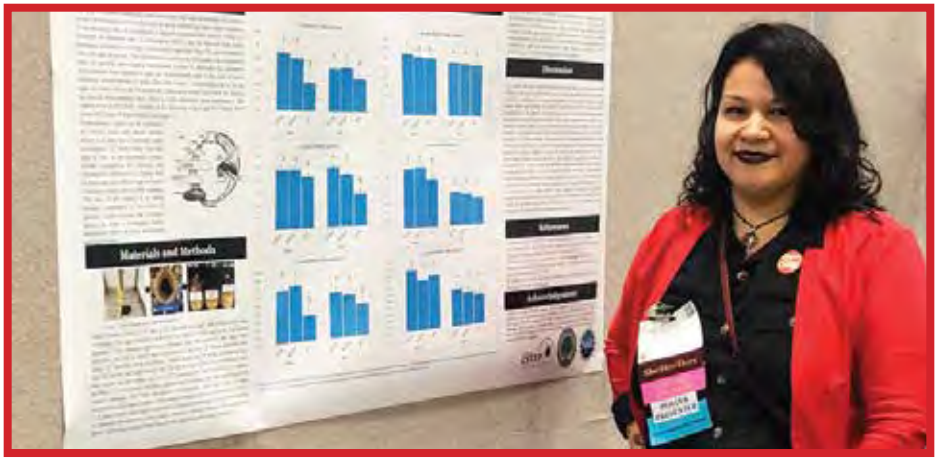
> **—Yvonne Sandoval**





ANTHONY CARPI
PRISM Director

"Through your accomplishments, you represent the promise of your generation."

EDGARDO SANABRIA-VALENTÍN
PRISM Associate Director

THIS IS A TIME OF CRITICAL DECISIONS both in your time as students and in the world around us. As we have seen with the outbreak of COVID-19, scientists and medical researchers are being called on to help us understand the virus, provide strategies to minimize its transmission, and develop vaccines and treatments to help us respond. As part of the scientific workforce, you will contribute novel ideas and discoveries to human kind. You and your peers will play essential roles in bringing justice, in all its dimensions, to our communities. And the role of mentors, colleagues that provide us guidance and advice, whether on our careers or on our science, is as important than ever. At PRISM, we are proud of the role we play as mentors and advisors, developing the next generation of fierce advocates for justice. Our students' successes will help change the world and we take seriously our role in their lives. Now, more than ever, it is clear that every decision we take has an impact that reverberates through the world. And the world will need leaders that have the tools and skills to make those important decisions. You are those emerging leaders.

This year you have continued to put John Jay College on the map by winning awards, participating in research and professional internships, and furthering your education. Isaac Paredes (page 12) and Derek Casarrubias (page 7) will participate this summer in Research Intensive Summer Experience (RISE) at Rutgers University and the FBI Honors Internship Program, respectively. Some of you will also continue their educations in research, healthcare, and technology. Nick Almodovar (page 12) and Raider Rodriguez Del Orbe (page 17) will begin their doctorates in science at Weill Cornell Medical College and University of Buffalo next fall, respectively. Beatriz Mercado (page 12) will continue her training at the Brown University Post-baccalaureate Research Education Program (PREP). Marjorie Gray will begin this year her dental medicine training at NYU School of Dentistry, while alumna Danielle Rouse ('16) begins her master's studies in pharmacology at St. John's University.

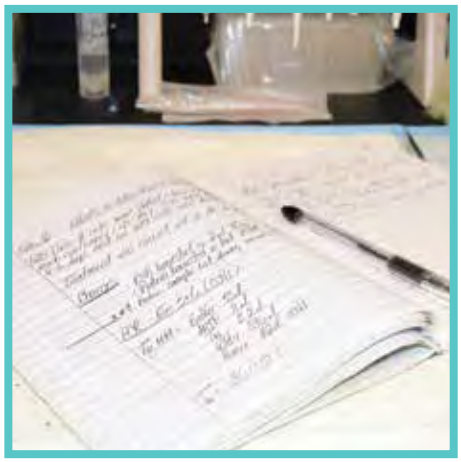
Decisions are made by those who show up, and you showed up with your dedication to your research and your mentors. Through your accomplishments, you represent the promise of your generation. We are hopeful for the future because you are part of it, and exceedingly proud of you all for being FIERCE ADVOCATES FOR DIVERSITY, INCLUSION AND JUSTICE IN SCIENCE.

"Through PRISM, I have explored my career options and scientific ventures. Being part of PRISM has definitely been one of the major highlights of my undergraduate career."

—Francheska Cadiz

"From my research experience, I have learned that science is a process. There are many steps that need to be followed in order to produce a solution."

—Liana Albano



"PRISM has given me the necessary resources to expand my horizons by exposing me to new and exciting fields and practices. As time progresses, I believe the skills I have developed will help me reach what I consider two attainable goals: to earn a PhD and to use said PhD to improve the lives of many."

—Nickolas Almodovar

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

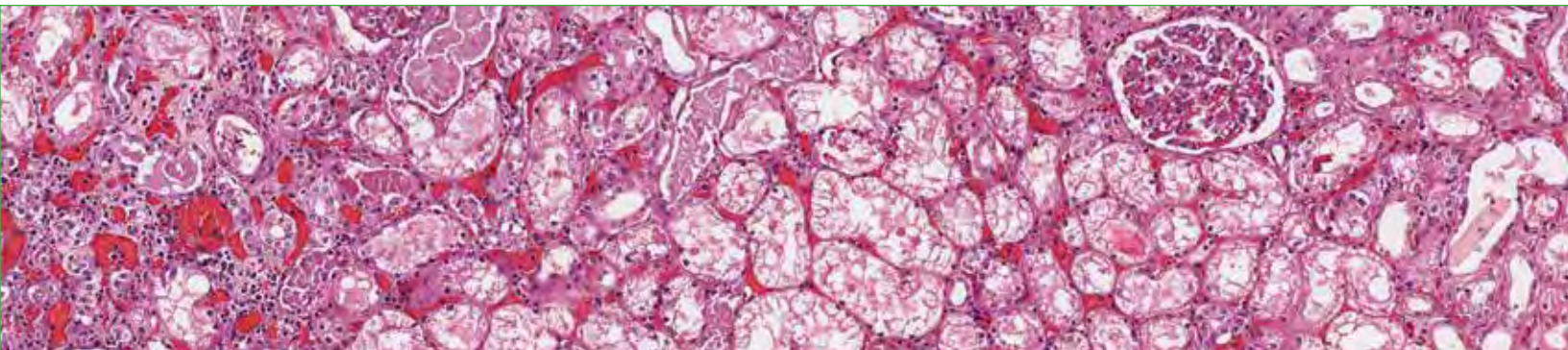
Criminalistics uses scientific methods and principles during the criminal investigation process to analyze physical evidence—such as chemical traces, ballistic evidence, controlled substances, and marks on tools employed in a crime. PRISM students use the latest technologies to develop more sensitive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

Derek Casarrubias

Artificial and Natural Chamois Skin as a Human Skin Stimulant (Dr. Diaczuk)

I have always been enamored by the fact that science could be used to analyze evidence found at a crime scene. However, it was not until I saw an episode of *Forensic Files* that I knew I wanted to pursue science. In the episode, a picture containing a woman's shadow and the sun's position were utilized to determine her height. I was amazed and fascinated! Through my research in ballistics, I have learned about the interactions between a projectile, such as a bullet, and animal skin which mimics human skin. I am not entirely sure what my post-graduation goals are, but I do have an interest in attending graduate school.

Gelatin and pig skin are human tissue substitutes commonly used to study ballistic wounds. Unfortunately, these substitutes have a short shelf life. In my research, I use cost-effective artificial and natural animal skin to determine their efficiency as substitutes for human tissue.



Francheska Cadiz

Analysis of Optical Properties of Soils Using Polarized Light Microscopy for Forensic Applications (Dr. Reffner)

When I was younger, I was so intrigued by the different fields and topics that science has to offer; there was no limit to what you could explore! My experience in research has confirmed my love for exploration and has opened many new points of views for me. It has also influenced my goals for the future: I plan to go to graduate school and pursue a PhD in environmental sciences. Through PRISM, I have explored my career options and scientific ventures. Being part of PRISM has definitely been one of the major highlights of my undergraduate career.

My research characterizes the unique properties of earth materials such as minerals, rocks, and other components of soil. Doing so will allow us to create an efficient procedure for working with soil evidence in forensic applications.

Liana R. Albano

Analysis of Polymer Coated Bullets Using Spectroscopic Methods (Dr. Diaczuk)

From a young age I was fascinated by science. It was always my favorite subject in school, and I enjoyed learning about it. I chose to go into science because of my forensic science teacher in high school. She thoroughly appreciated teaching forensic science which made me want to learn more and even pursue a career in it. From my research experience, I have learned that science is a process. There are many steps that need to be followed in order to produce a solution. My goals for the future are to receive a master's degree in forensic science and pursue a career as a criminalist.

Ammunition may be coated with polymers like nylon or Teflon to decrease friction and smoke produced when bullets are shot. My research project focuses on analyzing the polymer coating of bullets to understand their composition as well as the properties it possesses. Identifying the composition of the polymer coating can show whether they contain harmful substances that would present a danger to the user of the firearm.

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.

Floralba Gjergjova

The Effect of Varying Morphine Concentrations on the Development of *Phormia regina* (Dr. Rosati)

Science has been the only topic to prod me out of my comfort zone. As I began reading about the metabolization of drugs and chemical pathways, I realized my true interest lies in the chemical processes associated with metabolization and elimination rates of biological systems. The uncertainties and challenges that arose while working on this project have strengthened my skills for innovation and creativity in problem solving as well as preparation for potential issues. This research project solidified my plans to pursue a PhD in a field related to toxicology or biochemistry.

My project looks at the impact of morphine on the development of the fly species, *Phormia regina*. Understanding the development of this species in decomposing bodies will provide information on its potential use in time of death determinations in criminal cases.

Yvonne Sandoval

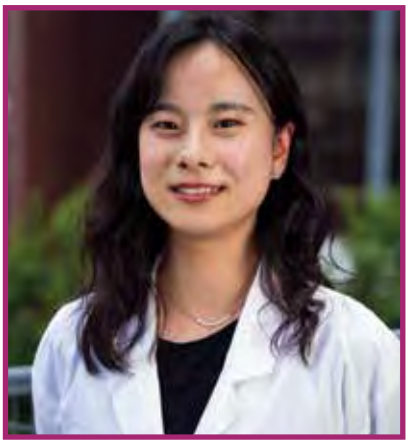
Density-Dependent Effects during Larval Development of Blow Flies (Diptera: Calliphoridae) (Dr. Rosati)

My experiences with PRISM and my involvement in the lab have helped me discover new skills and interests. I learned my passion is applying scientific knowledge to help my community. I have set out to pursue an MD/PhD to understand how the immune system functions and to discover how components of marihuana can be used as alternative medicine. Performing undergraduate research has shown me that I can test out ideas and fill gaps in our knowledge. Through my experiences at John Jay and PRISM, I have enjoyed learning more about the world of science and the potential I have to thrive.

The objective of my research is to understand how resource scarcity (i.e. food and habitat) affects the development and behavior of blowfly larvae. This work will improve the reliability of time of death estimations based on blow fly larval development and colonization.

Physical and Forensic Anthropology

Physical and forensic anthropology, scientific sub-disciplines of anthropology, study the biological basis of the human form and structure, as well as human behavior. This can help law enforcement identify and analyze human remains. Our students are developing or improving methods to aid in these investigations.



Ayana Ikenouchi

A New Enzymatic Method by Using Proteolytic Trypsin Enzyme to Extract DNA from Decayed Bones for Forensic DNA Analysis (Dr. Li)

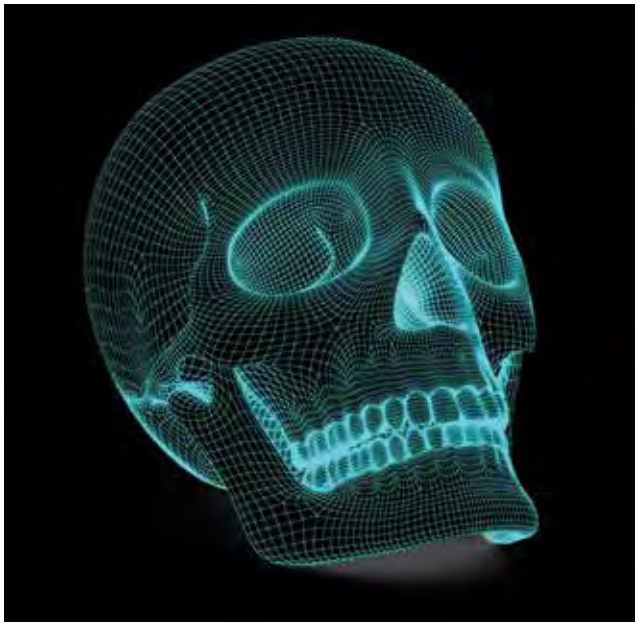
Before coming to John Jay, I was into science but not yet into forensic science. When I was in middle school, a big earthquake and tsunami happened in my country, Japan. A lot of people were missing and could not be identified. It was through forensic science that DNA samples were analyzed, and the missing individuals identified and returned to their families. For this reason, I came to the United States and enrolled in John Jay College to study forensic science to help people and society. My final education goal is to get a PhD in molecular biology or genetics.

I am developing a method to extract DNA from decayed bones for forensic DNA analysis by adding the enzyme Trypsin, a protein that helps break down a component of bones. Compared with mechanical methods to extract DNA from bones, this new method does not require physical force, and takes less time. Most importantly, it can help to quickly analyze a large number of samples when a big disaster happens.

Hilary Menes

Structure from Motion 3D Rendering of Bone Traumas and Pathologies (Dr. Corthals)

As a child, I would bother my parents with endless questions about the world around me. I was fascinated by everything, and I would not stop asking questions until I was satisfied with the answer I received. This curiosity led me to become an avid reader growing up, and this is what led me to the path of science. My experience in research has increased my fascination and curiosity in the world around us. I plan to pursue a PhD in forensic anthropology. Thanks to PRISM, I am able have hands-on experience in research.



The focus of my research is to create a software program that turns pictures of human bones into 3D models of these bones. The final program will allow forensic anthropologists to create a 3D model of a picture containing human bones, and use the model to quickly analyze specific features of the human bones.

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

Chanté Guy

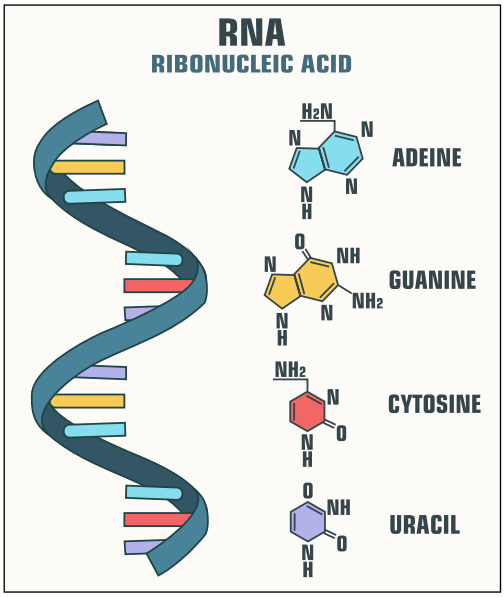
Effects of Epigallocatechin-3-Gallate (EGCG) in Triple Negative MDA-MB Breast Cancer Cells(Dr. Delgado-Cruzata)

Growing up, I always questioned the existence of everything I encounter. Conducting research has quenched my thirst for investigating and finding the answers to these many questions. PRISM has allowed me to explore this side of myself, while developing skills I will employ in my future career. I have grown as a scientist and a communicator of science through my research experience. This experience has inspired me to pursue a PhD in biomedical sciences. As Carl Sagan would say, "Somewhere, something incredible is waiting to be known," and I want to be part of those discoveries.

My current research project investigates how the green tea component, Epigallocatechin-3-gallate (EGCG), affects breast cancer cells. EGCG shows great promise as a preventative measure for breast cancer.

John François

Determining miRNA Levels in the Serum of Rheumatoid Arthritis Patients (Dr. Delgado-Cruzata)



Originally from St. Lucia in the Caribbean, I am a junior majoring in cell and molecular biology. Biology and math were always subjects that came easily to me growing up, so it was easy to decide what I wanted to study in college. I plan to pursue a PhD in biological sciences and eventually conduct independent research on lymphoid malignancies in the human body. I appreciate the fact that PRISM has provided me with first-hand research experience, and I love how eager my mentor and the PRISM staff are to support me in the pursuit of my career goals.

RNA molecules occur naturally in human blood. I am determining the quantities of various kinds of RNA molecules in individuals suffering from rheumatoid arthritis. This work will allow us to determine if there are specific RNAs that are involved in the development of this disease.

Nickolas Almodovar

Analysis of mRNA Expression Changes in Breast Cancer Cells After Exposure to Mitomycins (Dr. Delgado-Cruzata)

From a very young age, my passion for science has been part of my identity. I have always been fascinated with understanding what things are made of, and how things work at the atomic level. As an undergraduate researcher, I have developed a deeper respect for the scientific field as a whole. PRISM has given me the necessary resources to expand my horizons by exposing me to new and exciting fields and practices. As time progresses, I believe the skills I have developed will help me reach what I consider two attainable goals: to earn a PhD and to use said PhD to improve the lives of many.

My research focuses on investigating gene expression changes in breast cancer cells after treatment with different members of a chemotherapeutic class of molecules named mytomycins. Our work will help us identify differences in molecular targets among this family of compounds, and provide further knowledge on their biological mode of action and potential uses in the clinic.

Evolutionary 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 lead to species evolving. At John Jay, our students compare the genes of primates to those of humans to understand what makes humans unique.

Beatriz Chantel Mercado

Discovery and Classification of a Human Unique MicroRNA (Dr. Lents and Dr. Johnson)

Growing up I was always curious about the world. This ultimately fueled my passion for science. As a researcher, I started to develop my own questions and innovative ways to answer these questions. Through my participation with PRISM, I have been able to improve my communication and critical thinking skills. This experience has helped me refine my future career goals. I want to obtain my PhD in synthetic biology and become a primary investigator and professor at a research-intensive university.

Our research compares the human genome to the chimpanzee genome to find the parts of our DNA that are unique to humans as a way to understand how we have evolved.

Isaac Paredes

An Evolutionary and Bioinformatics Exploration of Vitamin B12 Absorption (Dr. Lents)

The individuality of members within and across species has always perplexed me. This is why I chose a career in science so that I could learn what lies behind every corner of life. Throughout my research in epigenetic and neuroscientific studies, what sticks out the most is the amount of patience necessary for any scientific process. I want to work in an environment that welcomes questions of all sorts; which is why I aspire to pursue a PhD in evolution and ecology with the intent to eventually become a professor and research conservation ecology.

Vitamin B12 is created by the bacteria in our gut. My research project focuses on finding out, evolutionarily, when humans became unable to absorb the vitamin B12 created by this bacteria. Our research goal is to better understand the dietary requirements of humans that can help them lead more healthy lifestyles.

José A. Galván Corona

Developing a Python Code to Uncover the Potential Evolutionary Origins of microRNA Genes in the Genomes of Ancient and Modern Primates (Dr. Lents and Dr. Johnson)

The sophistication required for our cells to communicate with each other has always boggled my mind; how can trillions of cells come together to make me? I have always been curious about how cellular mechanisms are regulated. My work in computational genomics has taught me that every cell is an immensely intricate puzzle composed of regulatory mechanisms. I plan to pursue a career where I can better study these mechanisms.

My research compares microRNA genes from the human genome to the genes of our surviving primate "cousins", as well as other extinct human species. Attempting to uncover the evolutionary origins of these gene regulating RNAs may bring us closer to understanding what makes humans unique.

Samantha Vee

Evolution and Expression of MIR3928 in Humans and Other Apes (Dr. Lents and Dr. Johnson)

I am a senior majoring in cell & molecular biology and minoring in gender studies. I have always been fascinated by the natural world around us, so choosing to study science was an easy choice. My experience at John Jay has truly been amazing with the support of PRISM and Macaulay Honors College. Not only have I been able to hone my skills as a research scientist under the guidance of my mentors, but I have also become a part of a community of students who are equally as passionate about science as I am. After graduation, I hope to pursue a PhD in evolutionary biology.

My research focuses on studying how microRNAs are involved in human evolution. Towards that goal, I look at a specific microRNAs to understand its role in gene expression in humans and primates.

William Higgins

The Identification and Evaluation of Orphan Genes Across Multiple Genomes through the Use of Computer Programing (Dr. Lents and Dr. Johnson)

I have lived my whole life questioning how our bodies work. Why do we get sick? How do our bodies fight these sicknesses? This curiosity fuels my love for science, more specifically biology. It has taught me that I want to pursue a PhD in a field that will help defeat chronic illnesses. Before coming to John Jay, I thought scientists worked in a lab and were always on their own. Thankfully, I have learned that being a scientist is doing tons of research with a community of people who are interested in the same field as you, which is way better than I could have ever imagined.

My research uses computer coding to find new genes in our genome and compare them with chimpanzee and Neanderthal DNA. This will help us understand how humans evolved and how that evolution made us different from other species.

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.

Andrew Candia

Examination of Mercury Levels in Multiple Brands of Cat Food (Dr. Carpi)

Life can work in mysterious ways. For me, middle school science was the bane of my existence. That feeling stuck with me until high school. I found solace when I met both peers who shared their experiences, and my mentor who started my passion towards understanding the unknown. My dream then was to follow her words and try to enter the science realm, but John Jay did more. Now I am a passionate student of chemistry. The PRISM staff has encouraged and supported my academic journey and introduced me to my mentor who helped in my chemistry pursuits.

My work is centered on measuring the amount of mercury present in different fish-based brands of cat food. While fish are known to accumulate mercury, the level of contamination in cat food is not known and, if high, might represent a significant danger to household cats.

Atera Alam

Study of the Microbial Influence on the Reduction of Mercury in Natural Soils in the Dark (Dr. Carpi)

I remember my interest in science growing when I read a book on cosmology. Over time, I realized there was so much in the world yet to be invented and discovered. So, I came to college to study forensic science with a concentration in molecular biology. My research and studies at John Jay have inspired me to further pursue an advanced degree. My goal is to earn a PhD in physical chemistry.

Mercury can be found in soil, which contains microorganisms, and is subject to external factors like sunlight and rain. Our research seeks to understand how mercury found in soil loses and gains electrons under two circumstances: (1) in the presence of soil microorganisms, and (2) when it is subject to external factors, like sunlight and water.

Elvin Colón

The Effect of Sterilization on the Reduction and Emission of Mercury from Soil (Dr. Carpi)

I had always wanted to learn more about the environment around me, which sparked my curiosity in science. During my freshman year in college, I decided to major in forensic science without knowing anything about the field. I later began to develop a huge interest in chemistry once I experienced my first general chemistry lab. As an undergraduate research student, I have learned how to integrate theories from other projects into my own and learned how to conduct research independently. My goal is to achieve a PhD or master's degree in toxicology.

Our lab studies the movement of the toxic metal mercury and how it moves through the environment. Through my research, I aim to understand how the way we prepare the soil to measure mercury emissions affects the amount of mercury being emitted. Our goal is to understand the possible variables that can affect mercury emissions.

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.

Alejandro Ocampo

Development and Validation of a Liquid Chromatography Tandem Mass Spectrometry Method for the Determination of Cannabinoids and Phase I and II Metabolites in Placental Tissue (Dr. Concheiro-Guisan)

Growing up, I was obsessed with forensic science shows. It fascinated me how a tiny cut of a cigarette butt could be linked to the smoker through DNA analysis. During my undergraduate studies, I learned that through PRISM, I had an opportunity to do research outside of the classroom. After being accepted into PRISM and conducting my first research project, I have learned that scientific study requires trial and error and troubleshooting before reaching a working scientific method. I plan to pursue a career in research aimed in innovating new ways to analyze physical forensic evidence.

We are developing a method to detect marihuana use during pregnancy, looking at the placenta as a biological material. I investigate how much of the marihuana component that gets one "high", makes it to the placenta, potentially, reaching the fetus.

Frank Martin Gutierrez

Development of an Analytical Method for the Determination of Cannabis Exposure During Pregnancy (Dr. Concheiro-Guisan)

When I started at John Jay College as a freshman, I had dreams of becoming a forensic scientist, like those I had seen on television. However, through my undergraduate studies, I discovered a love for chemistry that changed my mindset regarding what a forensic scientist does. This new idea of what a forensic scientist is, combined with an interest of how drug use affects society, and a desire for change trained my sights on forensic toxicology. Joining PRISM has allowed me to take the first steps towards my goal of becoming a forensic toxicologist, while giving me the experience to help me attain a PhD after graduation.

The focus of my project is to determine whether or not we can detect marihuana in the placenta after consumption by the mother. This information will be used to help evaluate whether the placenta is best for analyzing fetal marihuana exposure.

Keiann Simon

Investigation of Nicotine, Tetrahydrocannabinol (THC), and Vitamin E in E-Cigarette Liquids (Dr. Concheiro-Guisan)

I am dedicated to studying forensic science because of personal observation regarding the lack of proper evidence analysis, and the part it plays in the disruption of justice in my home country, Guyana. The procurement of a PhD in toxicology and pharmacology will allow me to achieve my full academic and professional ambitions to improve the forensic system of South America and the Caribbean. My PRISM experience and participation in undergraduate research allow not only for the acquisition of new knowledge in science, but also the application of science for the improvement of health and wellness in society.

My research project develops a method to isolate and study the components of e-cigarette liquids, specifically nicotine, tetrahydrocannabinol (THC), a component of marihuana, and Vitamin E. Because vaping delivers higher concentrations of these components compared to traditional consumption methods, there is a greater likelihood that the components in e-cigarettes will increase the rate of degeneration of the brain and lungs.

Samantha Nolan

Fast Screening Method for Drug-Facilitated Sexual Assault Drugs by Direct Mass Spectrometric Analysis of Dried Urine Spots (Dr. Concheiro-Guisan)

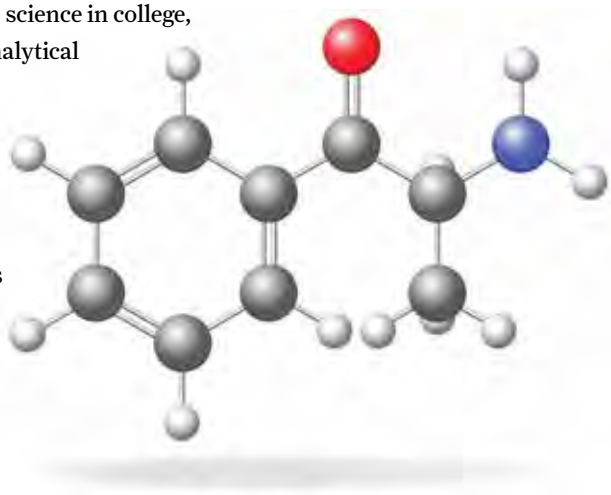
I began participating in science fairs when I was a kindergartner. My project that year was simple, but each year my projects became more complicated and time-consuming. I learned quickly that science is the basis for every single thing in our environment. It explains all to us, or sometimes nothing at all, making us search even harder for answers. The scientific process was fascinating to me, and I looked forward to it every year. For me, spring brought flowers, warmer weather and science experiments. My research at John Jay has reignited the passion for science that I felt as a child.

My research project aims to provide a quick and specific screening tool to detect drugs commonly used in sexual assault cases. Successful completion of this project will simplify drug detection in urine samples.

Steven Towler

Development and Application of an Analytical Method for the Determination of MDPV and Metabolites in Rat Brain (Dr. Concheiro-Guisan)

I never imagined pursuing a career in science growing up. This all changed when I took a general chemistry class in high school. Not only did I do well in the class but I found myself wanting to learn more. This interest further piqued the following year upon taking a forensics course. After studying forensic science in college, my fascination with the application of analytical methods guided me towards toxicology. My experience in PRISM has solidified my career path, and has vastly expanded my abilities in the lab. I plan to pursue a master's or PhD after my undergraduate studies.



In my project, we are developing a new method to measure the concentrations of synthetic cathinones, a category of drugs commonly known as "bath salts," in brain tissue samples. To do this, we use brain tissue extracted from lab rats that were previously administered varying doses of a cathinone. Our work will provide insights into how these new types of drugs are processed by the body.

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.

Joy Alejanzales

Epigenetic Modification by Mancozeb in Astrocytes (Dr. Cheng)

For as long as I can remember, I would spend hours watching forensic crime and crime drama TV show marathons, all along aspiring to be a forensic scientist or a lab technician one day. Then, in high school, we were learning about the anatomy of the brain, and it floored me how little we actually know about it. The variety of intriguing unanswered questions piqued my interest in going into research as a full-time job, one that I had not considered previously. I plan to go to grad school and get a PhD in neuropharmacology to understand how we perceive pain from a neuropharmacological standpoint.

Our lab studies how exposure to pesticides interfere with the molecular mechanisms behind some neurodegenerative diseases. My research aims to understand why Mancozeb, a fungicide, affects brain cells and leads to Parkinson symptoms.

Raider Rodriguez

Analytical Determination of Methylone and its Metabolites in Brain Tissue by Liquid Chromatography Tandem Mass Spectrometry (Dr. Concheiro-Guisan)

Early in my childhood, I read one of those bottle labels that say: "Keep out of reach of children." Since then, I have been interested in the effects of drugs on the body and decided to pursue a degree in toxicology. Under the guidance of Dr. Concheiro-Guisan, I have learned what paths to take when it comes to solving a scientific problem. Being part of my lab has also taught me the value of teamwork, persistence, and passion for what you do. My experience as a PRISM researcher has heightened my curiosity for science, and it has encouraged me to pursue a PhD in pharmacology.

My research involves the development and validation of an analytical method to identify and quantify methylone, a recreational drug, and its break down products in rat brain tissue. This project will give us a new way to study how this drug works in the brain.

Samara Pettie

Epigenetic Modification by Mancozeb in Astrocytes and PC12 Cells (Dr. Cheng)

I chose science as a major because of my fasciation of the brain and all of its unknown properties and capabilities. From my research experience, I have learned that consistency and inquisitiveness is essential to the scientific process. In the future, I plan to attend medical school to pursue a career in neurosurgery. The most enjoyable part about my PRISM research experience is having a mentor who is passionate about her research and pushes me to think more critically.

My research examines the effects of low doses of the pesticide, mancozeb, on brain cells. This study will help us further understand how low doses of these pesticides lead to neurological disorders, such as Parkinson's disease.

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.

Jahvon Johnson

Development of Non-Precious Metal Catalysts Using Organic Chemical Synthesis (Dr. Zhang)

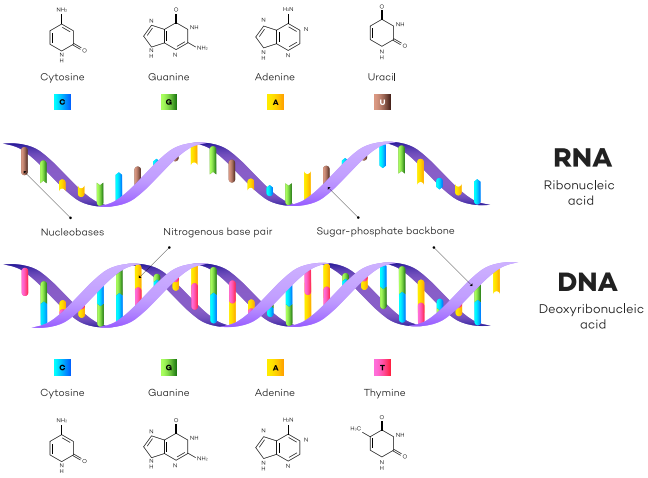
My passion for science ironically started out of boredom in my elementary school science class. I made the random decision to pick up a textbook. I was immediately enthralled by the boundless ideas contained within, even though I could not understand most of the book. Driven to accumulate knowledge, I took more and more science classes until I found myself at John Jay, and eventually PRISM. PRISM has allowed me to use what I have learned to assist in my mentor's research, while also learning new things as well. I plan to pursue a PhD after my undergraduate studies.

My research project focuses on using non-precious metals to create compounds that increase the speed of chemical reactions. These compounds can then be used in industrial reactions to make them more efficient and environmentally friendly.

Kedwin Gabriel Melendez

Using CD Spectroscopy to Determine the Chirality of RNA (Dr. Proni)

Since I was a child, I have always been fascinated with how things work. I can remember always asking my parents how things worked and why. Through science, I am able to discover the answer to these questions that no one was able to answer for me. Through my research experience, I have learned that discovery takes time and dedication. Even after being in the lab for hours, I have barely scratched the surface and have more questions than answers. As a result of my experience with research, I want to get a PhD, and make discoveries of my own.

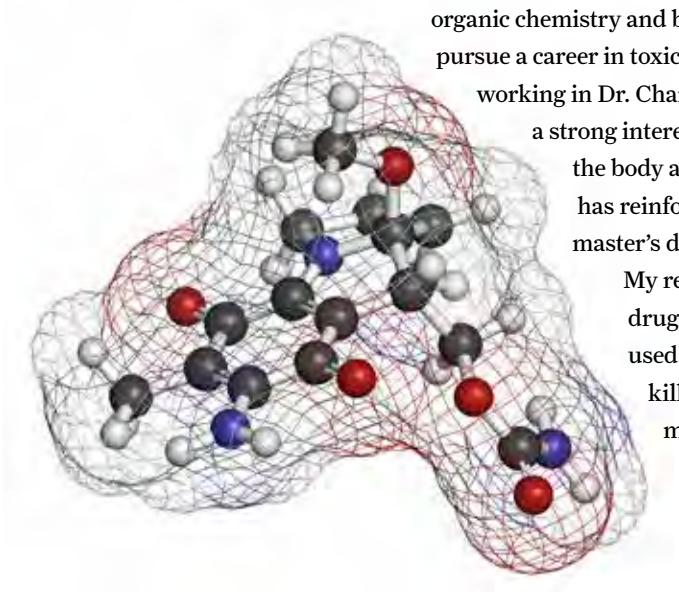


I am looking at how the structure of RNA, a biological molecule that transmits genetic information inside of our cells, changes in the presence of other biological molecules, like DNA, or proteins. To study the how the structure of RNA changes, we are using Circular Dichroism (CD) spectroscopy. With this new information about RNA, we can advance medicine and help more people.

Nicholas Towler

Synthesis and Characterization of DNA Interstrand Crosslinks Formed by a Mitomycin C Derivative (Dr. Champeil)

I have always had a passion for science and understanding how things work. However, I did not know what career I wanted to pursue until my sophomore year at John Jay. Taking organic chemistry and biochemistry inspired me to pursue a career in toxicology. Joining PRISM and working in Dr. Champeil's lab helped me develop a strong interest in how drugs interact with the body and the environment, which has reinforced my decision to pursue a master's degree in toxicology.



My research focuses on understanding how a newly synthesized anti-tumor drug kills cancer cells. This drug is a derivative of Mitomycin C, a commonly used chemotherapeutic agent. Understanding how this new drug works to kill cancer cells may revolutionize the way we treat cancer and may save many lives.

Timothy Snyder

Synthesis and Characterization of DNA Interstrand Crosslinks Formed by a Derivative of Mitomycin C (Dr. Champeil)

Model rocketry is how I developed a keen interest in science, especially chemistry, when I was younger. Sure, constructing the rockets was great, but it was what propelled them into the heavens that really excited me and served as the inspiration to study science years later. PRISM has given me the opportunity to pursue my scientific inclinations through organic synthesis under the mentorship of Dr. Champeil. I have gained invaluable experience being a member of her lab, with effective communication and improved critical thinking being the two most meaningful experiences.

My research involves identifying the manner in which a derivative of Mitomycin C, an anti-tumor drug, binds to DNA, which causes cancer cells to die. Understanding how the drug interacts with DNA could lead to the identification of other medically relevant compounds.

Zixuan Mo

Unusual Earth-Abundant Metal Complexes with Redox Acting Terpyridine Ligand for Reduction Catalysis (Dr. Zhang)

All things that exist in nature appeal to me. I love to think and explore the reasons for the existence of things as minute as the flapping wings of butterflies, or as complex as the four seasons of the earth. Science is a process of continuous discovery and exploration. In our laboratory, I repeat the procedures, refer to the works of others, and modify the details over and over. This valuable work experience taught me to think objectively from multiple perspectives, and to pay attention to every detail. I believe that it will help me succeed in graduate school.

For my research, I am making a compound that will speed chemical reactions and can be used as a catalyst for drug production. This is important because it can make the discovery of new drugs faster.

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, and developing new ways to use smart technology in our everyday lives.

Hunter Kearney

Can Malware Infect a Host Operating System From a Virtual Network? (Dr. Ahmad)

I chose to study computer science and information security because computers and how they work have always fascinated me. So far in my research experience, I have expanded my knowledge on subjects I learned in courses such as operating systems and advanced data structures. Connecting what I have learned in class with my research has been an enlightening experience. After I have earned my bachelor's degree and complete my research, I plan to go to graduate school to learn more about information security.

My research focuses on using a controlled network of virtual machines to understand if malicious software can potentially leak into a user's operating system. If the malicious software escapes the secure environment of the virtual machine, it could be disastrous for a network's infrastructure.

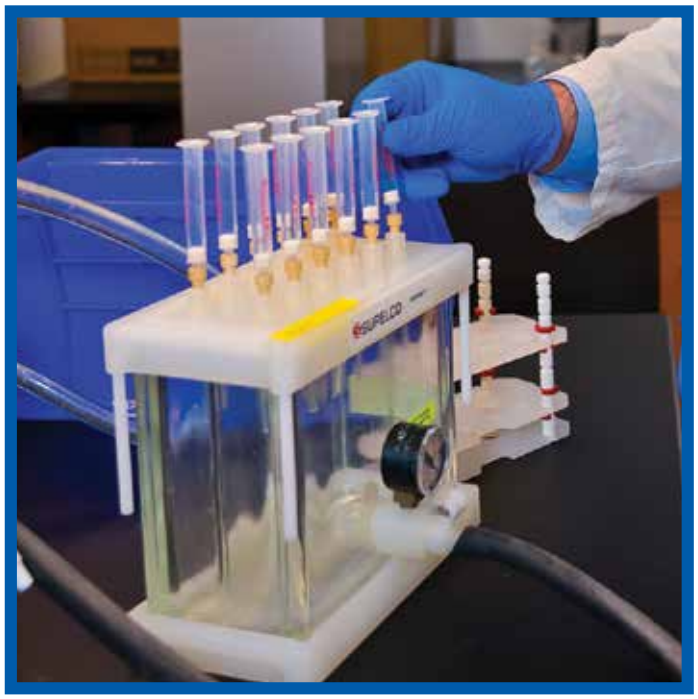
Zafar Seenauth

Reverse Engineering Rootkits (Dr. Ahmad)

I have always been curious about technology and how machines make decisions. My research taught me that machines are still learning, just as I am. My goals include entering the workforce as a leader in cybersecurity analytics. Doing undergraduate research has taught me to begin thinking not only like myself, but as those trying to uncover what the world has to offer. My favorite part of PRISM is relating what my research has taught me and then bringing it back to my type of thinking to truly have my own unique view.

Rootkits are a type of computer virus that renders antiviral software useless. I want to understand how these rootkits disable the antivirus software. To do so, I am using a virtual machine, which allows me to study rootkits without infecting the actual computer. If we can find out where the rootkits are and how they work we can render them useless.


PRISM
CHANGE
LEVEL
CAUSE
FLUX
DNA
CELL
FORENSIC
MERCURY
MZTEST
SPECIES
SAMPLE
DEVELOP
BONE
DATA
RESULT
DRUG
RESEARCH
ANALYZE
OBSERVE
DETECT
INCREASE
STUDY
TOXIC
BLOW FLY
COMPLEX
OVIPOSITION
MORE
ACTIVE
CANCER
RELATIVE
CREATE
CYCLE
JOHN JAY COLLEGE

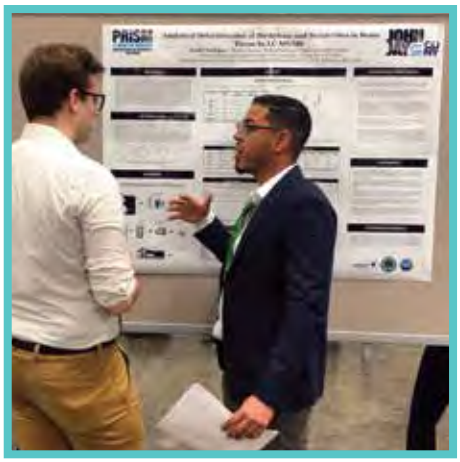


"My experience in research has increased my fascination and curiosity in the world around us. I plan to pursue a PhD in forensic anthropology. Thanks to PRISM, I am able have hands-on experience in research."

—Hilary Menes

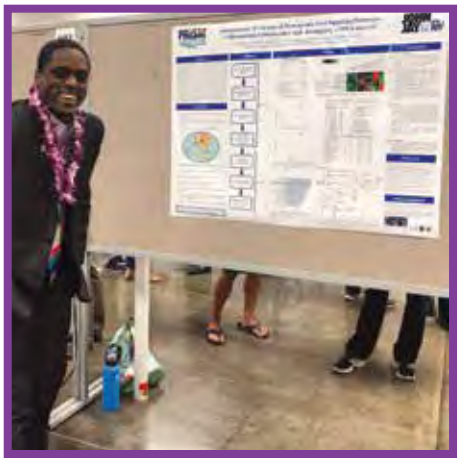
"PRISM has allowed me to explore this side of myself, while developing skills I will employ in my future career. I have grown as a scientist and a communicator of science through my research experience."

—Chanté Guy



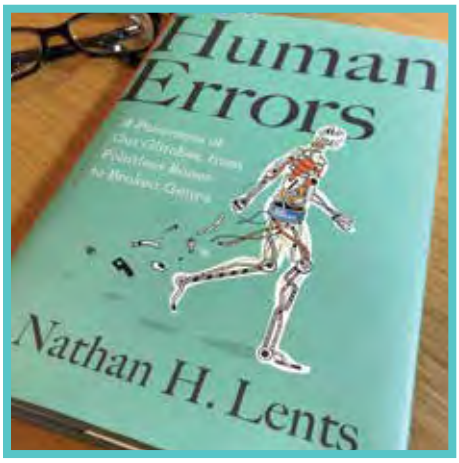
"I appreciate the fact that PRISM has provided me with first-hand research experience, and I love how eager my mentor and the PRISM staff are to support me in the pursuit of my career goals."

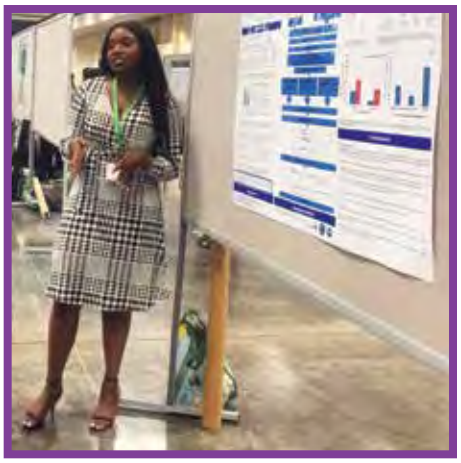
—John François



"Through my participation with PRISM, I have been able to improve my communication and critical thinking skills. This experience has helped me refine my future career goals."

—Beatriz Chantel Mercado





"The PRISM staff has encouraged and supported my academic journey and introduced me to my mentor who helped in my chemistry pursuits."

—Andrew Candia

"Connecting what I have learned in class with my research has been an enlightening experience."

—Hunter Kearney

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 (2018-2019).

Publications

Aguilar, W.*, Paz, M. M., Vargas, A.*, Zheng, M.*, Cheng, S.-Y., & Champeil, E. (2018). Interdependent Sequence Selectivity and Diastereoselectivity in the Alkylation of DNA by Decarbamoylmitomycin C. Chemistry - *A European Journal,* 24(50), 13278–13289. https://doi.org/10.1002/chem.201802038

Browne, T.*, Concheiro-Guisan, M., & Prinz, M. (2019). Semi quantitative detection of signature peptides in body fluids by liquid chromatography tandem mass spectrometry (LC–MS/MS). *Forensic Science International: Genetics Supplement Series,* 7(1), 208–210. https://doi.org/10.1016/j.fsigss.2019.09.080

Centazzo, N.*, Frederick, B.-M.*, Jacox, A., Cheng, S.-Y., & Concheiro-Guisan, M. (2019). Wastewater analysis for nicotine, cocaine, amphetamines, opioids and cannabis in New York City. *Forensic Sciences Research*, 4(2), 152–167. https://doi.org/10.1080/20961790.2019.1609388

Cheng, S.-Y., Vargas, A.*, Lee, J.-Y.*, Clement, C. C., & Champeil, E. (2018). Involvement of Akt in mitomycin C and its analog triggered cytotoxicity in MCF-7 and K562 cancer cells. *Chemical Biology & Drug Design,* 92(6), 2022–2034. https://doi.org/10.1111/cbdd.13374

Ho, V., Herman-Bausier, P., Shaw, C., Conrad, K. A.*, Garcia-Sherman, M. C., Draghi, J., ... Rauceo, J. M. (2019). An Amyloid Core Sequence in the Major Candida albicans Adhesin Als1p Mediates Cell-Cell Adhesion. *MBio,* 10(5). https://doi.org/10.1128/mBio.01766-19

Zacarias, O.*, Aguilar, W.*, Paz, M. M., Tsukanov, S., Zheng, M.*, Cheng, S.-Y., ... Champeil, E. (2018). Isolation and Rationale for the Formation of Isomeric Decarbamoylmitomycin C- N 6 -deoxyadenosine Adducts in DNA. *Chemical Research in Toxicology,* 31(8), 762–771. https://doi.org/10.1021/acs.chemrestox.8b00102

Zheng, M.*, Hwang, S., Snyder, T.*, Aquilina, J., Proni, G., Paz, M. M., ... Champeil, E. (2019). Synthesis of Mitomycin C and decarbamoylmitomycin C N6 deoxyadenosine-adducts. Bioorganic Chemistry, 92, 103280. https://doi.org/10.1016/j.bioorg.2019.103280

Centazzo N.*, Concheiro-Guisan M., "Analytical Techniques for the Identification and Quantification of Drugs and Metabolites in Wastewater Samples". Chapter 2 (28 pages) in "Wastewater-Based Epidemiology: Estimation of Community Consumption of Drugs and Diets". Editors: Subedi B., Burgard D.A., Loganathan B.G. Publisher: ACS Symposium Series; American Chemical Society, 2019, ISBN 9780841234406 | ISBN 9780841234413.

Presentations

2019 Collegiate Science and Technology Entry Programs Conference, Lake George, NY

Zheng,M.,*Champeil,E., Cheng,S.Y., (2019) Molecular Pharmacology Study of A New Derivative of the Anticancer Drug Mitomycin C, CSTEP Conference, Bolton Landing, NY, April 12-14, 2019

Herrera,R.,* Rosati,J., (2019) The Effect of Light Exposure on the Prepupal Wandering Behavior of the Common Green Bottle Fly, *Lucilia sericata,* CSTEP Conference, Bolton Landing, NY, April 12-14, 2019

Paucar,Y.,* Sullivan, K.E., (2019) Inducible Expression of Retroelements in Systemic Lupus Erythematosus, CSTEP Conference, Bolton Landing, NY, April 12-14, 2019

Rodriguez Del Orbe,R.,* Concheiro-Guisan,M., (2019) Analytical Determination of Methylone and Metabolites in Rat Brains by LC-MS/MS, CSTEP Conference, Bolton Landing, NY, April 12-14, 2019

Li,K.*, Johnson,H., (2019) Verifying the Authenticity of a Student's Diploma through Ethereum Smart Contracts, CSTEP Conference, Bolton Landing, NY, April 12-14, 2019

2018 SACNAS National Diversity in STEM Conference, San Antonio, TX

Cirilli, C.*, Albarracin, M.*, Bliese, A., Delgado-Cruzata, L., Effect of Methotrexate in the DNA methylation levels of the Dual specificity protein phosphatase 22 (DUSP22) promoter region. SACNAS 2018

Heredia, M., Rauceo, J., Functional and localization analysis of SPFH proteins in the fungus Candida albicans. SACNAS 2018

Other Conferences

Towler S.*, Centazzo N.*, Concheiro-Guisan M. "Determination of MDPV and its major metabolites in rat brain by liquid chromatography-mass spectrometry". Poster presentation at the 2019 Society of Forensic Toxicologists (SOFT) meeting in San Antonio, TX, October 14-18, 2019.

Centazzo N.*, Rodriguez R.*, Acosta T., Baumann M., Concheiro M. "Pharmacokinetics of methylone and its metabolites in male rats: relationship to brain serotonin depletion", Poster presentation at the 2019 meeting of The International Association of Forensic Toxicologists (TIAFT), Birmingham, UK, September 2-6, 2019.

Rodriguez R.*, Centazzo N.*, Concheiro M. "Determination of methylone and its three major metabolites in rat brain by liquid chromatography-mass spectrometry", Poster presentation at the 2019 meeting of The International Association of Forensic Toxicologists (TIAFT), Birmingham, UK, September 2-6, 2019.

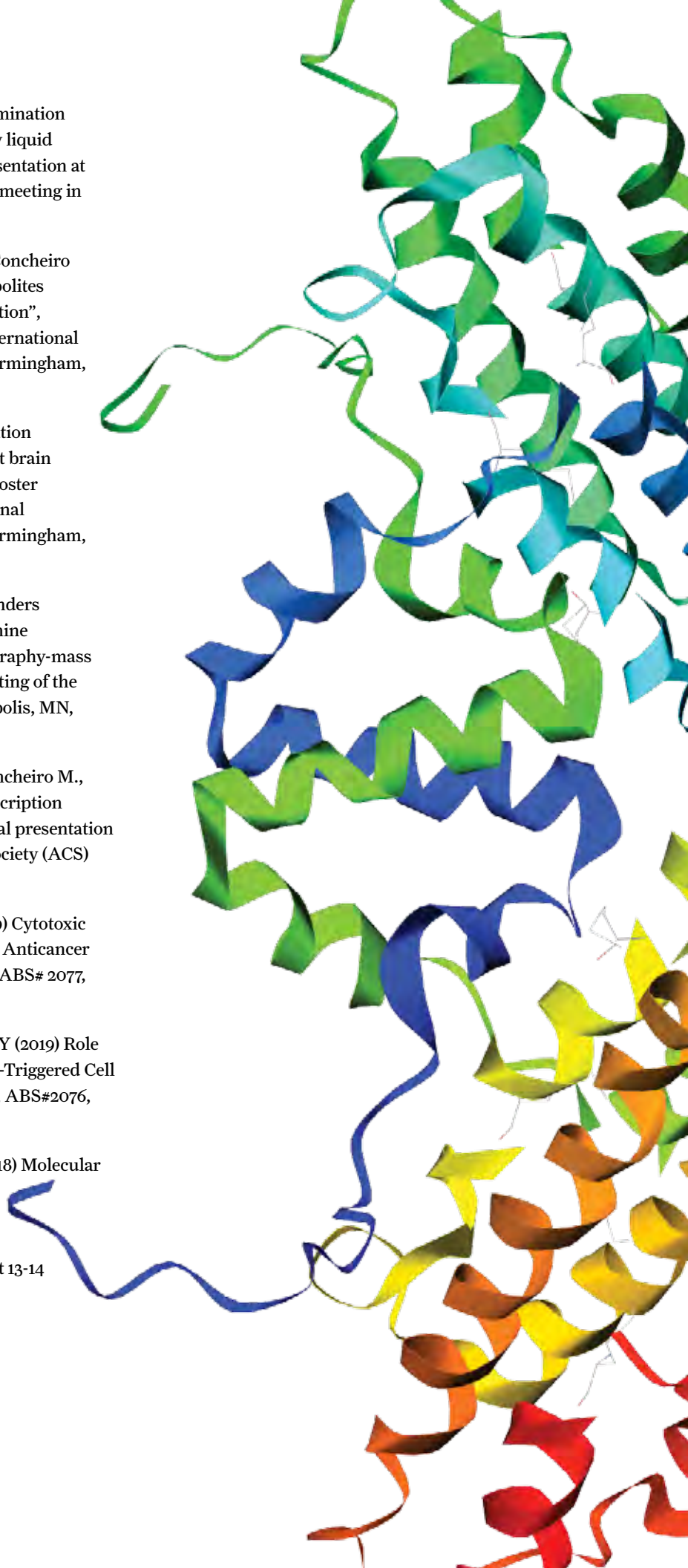
Centazzo N.*, Frederick B.M.*, Korostyshevsky D., Wanders L., Concheiro-Guisan M., "Fast and simple creatinine determination in wastewater by liquid chromatography-mass spectrometry, Poster presentation at the 2018 meeting of the Society of Forensic Toxicologists (SOFT) Minneapolis, MN, October 7-12, 2018.

Centazzo N*, Frederick B.M.*, Jacox A., Cheng S.Y., Concheiro M., "Wastewater-based epidemiology of tobacco, prescription opioids and drugs of abuse in New York City", Oral presentation at the 2018 meeting of the American Chemistry Society (ACS) in Boston, MA, August 19-23, 2018.

Zheng M*, Clement C, Champeil E, and Cheng SY (2019) Cytotoxic Mechanism of a Mitomycin C-Lexitropsin Hybrid Anticancer Drug. 58th Society of Toxicology annual meeting, ABS# 2077, Baltimore, MD, March 10-14

Gray M*, Vargas A*, Lee JY*, Champeil E, and Cheng SY (2019) Role of N-Ras and ERK in Mitomycin C and Its Analog-Triggered Cell Death. 58th Society of Toxicology annual meeting, ABS#2076, Baltimore, MD, March 10-14

Zheng M*, Cheng SY, Clement CC, and Champeil E (2018) Molecular pharmacology study of a new derivative of the anticancer drug mitomycin C. Nature Conferences: NYU Nature Conference on Chemical Biology, ABS#65, New York, NY, August 13-14



***Denotes PRISM student or alumnus.**

2020 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 100 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.

2020 PRISM Keynote Speaker: Dr. Olivia R. Orta

DR. OLIVIA R. ORTA graduated Magna Cum Laude from John Jay College in 2007, earning a Bachelor of Science Degree in forensic science with a concentration in toxicology. As a PRISM student, Dr. Orta worked under the mentorship of Dr. Anthony Carpi, where they focused on the quantification of "asbestos-like" fibers in the air surrounding John Jay. At the time, the construction of the NYC Third water tunnel was occurring behind the old John Jay Building. Asbestos fibers can occur naturally in the environment and boring into the bedrock can displace these fibers and release them into the air, adversely impacting respiratory health. Therefore, the monitoring of the release of these fibers during the construction process was an important toxicological endeavor. Findings from that work suggested that although the number of fibers in the air increased around the time of notified construction blastings, the number of fibers appeared to be within permissible levels.

After graduation, Dr. Orta obtained a Master of Public Health (MPH) in epidemiology and biostatistics from the CUNY School of Public Health at Hunter College where her research involved social determinants of reproductive health. Upon completing her MPH, she attended the Harvard T.H. Chan School of Public Health in Boston, Massachusetts. While there, she pursued a Doctoral degree in epidemiology under the mentorship of Dean Michelle A. Williams. For her doctoral research, Dr. Orta's work focused on stress as an important modifiable determinant of health. As one example, Dr. Orta evaluated the association between exposure to violence in childhood and levels of hormones in the body many years after the event. She found that those who experienced some of the most severe forms of violence in childhood had higher levels of these hormones in adulthood. Her findings support the notion that stressful life experiences in early life can impact the body's functioning, and health, many years after the event. Ultimately, she hopes that such research will be used to help improve the health of survivors of stress and trauma.

Currently, Dr. Orta is a postdoctoral research associate in the epidemiology department at the Boston University School of Public Health combining her experience in toxicology, biostatistics, epidemiology, and social determinants of health. Under the mentorship of Dr. Lauren A. Wise, she is looking into how exposure to both social determinants and chemicals impact reproductive health outcomes. Upon completing her postdoctoral work, Dr. Orta plans to continue with her focus on social determinants of health and hopes that such findings can be used to promote environmental justice policies. During her talk, Dr. Orta will discuss her research trajectory from John Jay College to Boston University, while sharing lessons learned along the way.

2020 PRISM Outstanding Undergraduate Researcher: Alejandro Ocampo

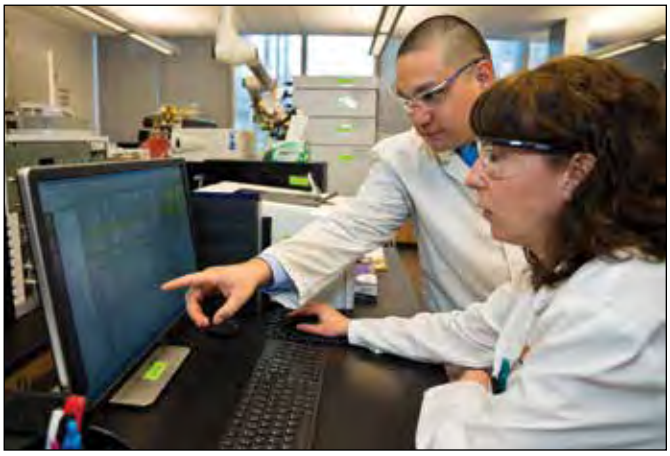
This year, Mr. Alejandro Ocampo has been selected as PRISM's Outstanding Undergraduate Researcher. This award recognizes the progress and the level of commitment to research displayed by one of our students, and their development as a scientist.

Alejandro was selected to be part of our Undergraduate Research Program during the summer of 2019. Since then, he has been working under the mentorship of Dr. Marta Concheiro-Guisan. Their research project investigates how to determine marihuana exposure during pregnancy. Together with other members of the Concheiro-Guisan lab, Alejandro is developing a sensitive analytical method that can detect delta-9-tetrahydrocannabinol, the psychoactive component present in cannabis, in samples taken from the afterbirth, or placenta. The goal of their project is to provide a sensitive and accurate method that can be used to inform health care providers about marihuana exposure during pregnancy so they can take the adequate interventions, or in forensic cases, such as custody cases or unexpected deaths.

In her nomination letter, Dr. Concheiro-Guisan noted that Alejandro "rapid learning skills, allowed him to work independently and develop his own project shortly after joining the lab... He constantly offers fresh and smart ideas to troubleshoot difficult and practical issues in the laboratory, showing exceptional critical thinking and reasoning competencies. His overall performance as undergraduate researcher has been totally above the average." She adds that "Alejandro has been able to successfully combine this incredible dedication in the research lab, with an exceptional performance in his courses and most impressively, working a full-time job throughout the year, following an extremely challenging and high-demanding schedule."

This year, Alejandro applied to various PhD and research post-baccalaureate programs in toxicology and pharmacology to fulfill his career goal to be an independent scientist. Dr. Concheiro-Guisan adds that "Alejandro is very humble and discreet, earning easily the respect and admiration of myself and the other students in the lab. I am certain that Alejandro will succeed in his goal of pursuing a successful career in science."

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 was not a simple task as all nominees demonstrated outstanding research skills. In addition, each mentor submits a nomination letter that is not only impressive but also heartfelt, showcasing the close working relationship between mentor and student.



Top left: PRISM Graduating class of 2018. Top Right: Keynote Speaker Dr. Zuleyma Peralta addresses our students. PRISM Staff celebrates our eleventh anniversary in 2018.

Former PRISM Symposium Speakers and Outstanding Undergraduate Researcher Award Recipients

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 Pittsburg 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, 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, currently at University of CA-San Francisco

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, currently at 3M

2011
Keynote: Kimberly Papadantonakis, PhD (CA Inst. of Tech)
John Jay Class of 2002
Award Recipient: Richard Piszczatowski, currently at Albert Einstein College of Medicine

2010
Keynote: Julie Layshock, 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 and forensic security
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
Lissette Delgado-Cruzata, PhD, MPH	Epigenetics and cancer epidemiology
Peter Diaczuk, PhD	Ballistics, trace analysis, blood splatter, microscopy, image analysis, and evidence examination.
Sven Dietrich, DA	Security and privacy, applied cryptography, and network security
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
Matluba Khodjaeva, PhD	Cryptography, security and privacy, and securely outsourcing computations to the cloud
Ekaterina Korobkova, PhD	Biochemistry, biophysics, and physical chemistry
Thomas Kubic, JD, PhD	Light and electron microscopy, vibrational spectroscopy, and image analysis to physical evidence examinations
Nathan Lents, PhD	Cell biology, forensic biology, genetics, and bioinformatics
Richard Li, PhD	Forensic DNA analysis, forensic molecular biology, and forensic genetics
Mechthild Prinz, PhD	Forensic Biology and forensic genetics
Gloria Proni, PhD	Supramolecular and molecular chirality, optical spectroscopy, and synthesis and characterization of small molecules
Jason Rauceo, PhD	Molecular biology, molecular genetics, and mycology
John Reffner, PhD	Microscopy, molecular spectroscopy, and materials science
Marcel Roberts, PhD	Electrochemistry, spectroscopy, and analytical chemistry
Jennifer Rosati, PhD	Forensic entomology, biology, entomology, 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, forensic chemistry, and metallic anticancer drugs

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

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 Junior Scholars Program, offers academic advisement, tutoring, and professional development activities to an additional 60+ 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.

In the 14 years since its founding, over 300 students have participated in PRISM, of whom more than 99% graduate. More than 100 students have moved on to post-graduate programs, almost half from underrepresented minority groups and the majority of whom are women. And 50 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 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
Follow us on Twitter, Instagram, and Facebook @JJCPRISM

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challenge yourself

investigate

engage

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PROGRAM FOR RESEARCH INITIATIVES IN SCIENCE AND MATH

network

inquire

examine

build connections

question

choose your future

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For information about the Program for Research Initiatives in Math and Science, please email the staff at PRISM@jjay.cuny.edu or visit **www.jjay.cuny.edu/PRISM**

To learn more about

PRISM at JOHN JAY COLLEGE

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To scan, just point your smartphone camera at the QR code, or visit

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