CADSTI-NE Newsletter

Empowering Caribbean youth through science & engineering experiences

NOVEMBER 2024

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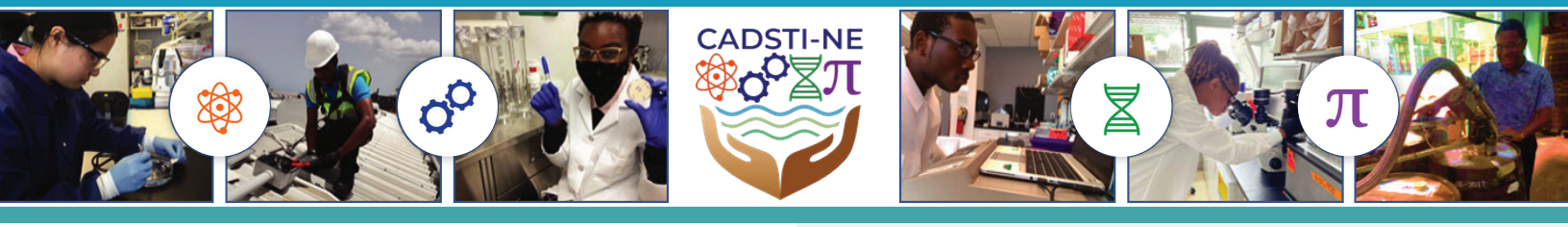


President's Message

Dear Friends and Supporters of CADSTI-NE,

Dinah Sah - President

It's truly a pleasure to share with you the highlights of the 2024 CADSTI-NE summer internship program, which was a great success! We organized 6 amazing student internships in biotech and high tech this year. Our SPISE graduates from the Caribbean were hosted by 6 organizations in Massachusetts and Barbados: Atalanta Therapeutics, Foursquare Rum Distillery, Lenstec (Barbados), Ocular Therapeutix, Voyager Therapeutics and West Indies Rum Distillery. In total, CADSTI-NE has now organized 71 internships for Caribbean youth since 2014, passing our 10-year milestone for the program! The CADSTI-NE leadership team worked tirelessly throughout the year, meeting nearly every Sunday morning to plan, coordinate and implement the internships. All of this was made possible by your continued support and the very generous contributions of the host organizations, both financial and in-kind. A huge thank you to our donors and host organizations for sharing in our vision to provide these transformative experiences in STEM for our high potential Caribbean students!

Sincerely yours,

Dinah Sah

Dinah Sah, PhD
President, CADSTI-New England, Inc.

About CADSTI-NE

CADSTI-NE is a U.S.-based 501(c)(3) non-profit organization launched in 2014 that focuses on empowering Caribbean youth through science and engineering experiences. Our major projects are to:

1. ***Coordinate and finance the summer internship program for graduates of the Student Program for Innovation in Science and Engineering (SPISE).*** SPISE is an annual intensive residential summer program launched in 2012 by the Caribbean Science Foundation for gifted Caribbean high-school students 16-17 years of age who are interested in studying and exploring careers in science and engineering. SPISE is modeled after MIT's MITES Program, and a major goal is to help groom the next generation of science, engineering, and business leaders in the Caribbean. CADSTI-NE's student internship program provides opportunities for SPISE graduates to experience first-hand the application of STEM to research and development within biotech, high tech and other organizations in the U.S., Canada, UK and Caribbean.

2. ***Support SPISE and other Caribbean Science Foundation STEM programs (Caribbean STEM Olympiads, Barbados Junior Robotics Camp)***

CADSTI-NE Leadership Team

Karen-Leigh Edwards, PhD, MBA
Lori Fitz, PhD
George Marecheau
Paul McLean, PhD
Dinah Sah, PhD
Joshua Sheldon, MBA
Cardinal Warde, PhD

In This Issue:

Biotechnology

Zaria Ferguson

Zaria Ferguson (Jamaica)

- Third year Biomedical Engineering major at Harvard University, Cambridge, Massachusetts, USA
- Ocular Therapeutix, Bedford, Massachusetts, USA

Zaria worked at Ocular Therapeutix, a biopharmaceutical company committed to improving vision through the development and commercialization of innovative therapies for retinal diseases and other eye conditions. She was an intern on the device team within the Product Development department, which is responsible for developing the drug formulation and device into a final drug-device combination product. This internship gave her experience in what day-to-day work looks like for engineers in a biopharmaceutical company. Coming into this internship, she had hoped to gain hands-on experience with device making, 3D printing, and working alongside professionals in the field.

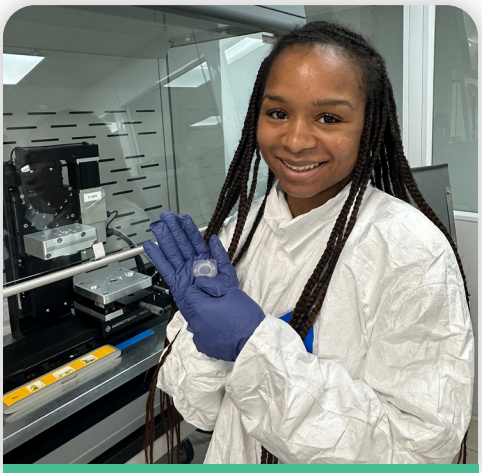
Zaria's role as a Product Development intern involved extensive design verification testing using an Instron machine to perform compression, puncture, actuation, and retention tests on over 250 injector samples. Running these tests repeatedly showed her the process behind creating a test method, running it then updating it to rectify any discrepancies. 3D printed fixtures are used to hold the injector in place during testing. With little to no experience in 3D modelling and printing prior, she completed SolidWorks tutorials and designed my own 3D print for the first time! She then used these newly developed skills to create updated testing fixtures, minimizing areas of variability during testing. Zaria's mini project was the Actuation Test Method investigation, where she assisted with tests for actuation of the injector, designed and updated 3D printed fixtures, and disassembled over 100 injectors to measure lubrication positions. This project honed her problem-solving skills, as we had to make modifications to the test method and fixtures to reduce variability in our measurements. Additionally, she gained experience with the Keyence Vision System, using it to collect microscopic images of injector samples and measure various dimensions including needle diameter, exposed needle length, and needle bevel angle. She also assisted with revising the test method that uses another microscope system called the Starrett to examine the needles.

Beyond the devices team, Zaria collaborated with the other interns to assemble approximately 600 injector training units. She assembled and capped the needles for the injectors, and this work gave her insight into downstream manufacturing processes. She also observed clinicians using the injector samples on pig eyes, allowing her to connect their feedback with the improvements made for verification testing.

Throughout the internship, Zaria saw the importance of teamwork in the product development department. While sitting in weekly devices team meetings, she saw that the tasks assigned to each person, though seemingly different, were all working towards the same goal. She enhanced her networking skills and gained valuable career advice by having lunch with people on the team, going on company outings and having one-on-ones with professionals at the company. She further improved her public speaking skills by doing a mini presentation at the company's town hall and a more in-depth presentation to the product development department.

Overall, this internship exposed Zaria to the world of device manufacturing and reinforced her passion for pursuing a career in biomedical engineering.

Biotechnology



Maria Malcolm

Maria Malcolm (Dominica)

- Third year Molecular Biology major at The University of the West Indies, Mona, Jamaica
- Lenstec (Barbados), Barbados

Maria participated in a 6-week internship at Lenstec (Barbados), Inc., a medical device company that designs, manufactures, and distributes high-quality intraocular lens implants and lens injection systems. The implants are used to replace the eye's natural lens during ophthalmological surgery, typically for the treatment of cataracts and other conditions.

Going into this internship, Maria's goals were to put the theoretical concepts she learned in coursework into practical use, to deepen her understanding of these concepts and their applications in industrial settings. She also sought to develop her critical thinking, problem-solving, and analytical skills while also improving her communication and presentation skills. She came into this internship expecting to be doing mainly laboratory work; however, in an unexpected but rewarding change, she was assigned a project to create a dashboard to track rejects from the manufacturing process and analyze recurring trends, due to her background in Computer Science. She built this dashboard in both Power BI and Excel and went on to create another dashboard in Power BI to measure employee productivity. This interesting project required a lot of on-the-job learning while applying prior knowledge. However, it gave her an immense sense of pride and fulfillment as it showed her what she is capable of once she commits to an outcome, and puts in the work, of course. In addition to her main project, she also got the opportunity to create molds that will become hydrophobic lenses using a pre-made monomer formulation and observe some of the tests done on the lenses, such as the tensile strength test. She also learned about the overall manufacturing process and the multitude of safety checks included to ensure that the lenses are of acceptable quality and free of contamination.

At the end of the internship, she presented her work to her coworkers.

Overall, this internship was a transformative experience for Maria. During her six weeks at Lenstec (Barbados), she was able to learn new skills, challenge herself, and grow personally and professionally. This internship has also confirmed that a STEM career is the right career path for Maria.

Biotechnology

Isabel Matthews

Isabel Matthews (Jamaica)

- Third year Molecular Biology major at Princeton University, Princeton, New Jersey, USA
- Atalanta Therapeutics, Boston, Massachusetts, USA

Isabel participated in a 10-week internship at Atalanta Therapeutics, a biotechnology company that has a novel RNAi technology for treating neurological disorders such as Huntington's disease. This technology platform makes use of branched siRNA compounds which can lower levels of messenger RNA encoding toxic proteins throughout the brain and spinal cord. Isabel's main goal going into this internship was to gain more hands-on laboratory and research experience, especially in the biotechnology industry. In addition, Isabel wanted to network and build professional connections that she knows will be valuable in her future.

At Atalanta, Isabel worked with the in vivo pharmacology team, carrying out her own research project, with the help of her mentor. One of the things she enjoyed most about working on this project was that Atalanta fostered an environment that encouraged not only asking questions but also independent thinking and problem solving. This allowed Isabel to think through problems on her own but with the necessary guidance to direct her planning, execution, and interpretation of experiments.

This was an eye-opening summer internship experience for Isabel as it confirmed to her that she wants to pursue research in graduate school and beyond. Overall, this was an unforgettable experience, and she is forever grateful to CADSTI-NE for facilitating this internship.

Biotechnology

Keonna Simon

Keonna Simon (Saint Vincent and the Grenadines)

- Third year Computer Science and Molecular Biology major at Massachusetts Institute of Technology, Cambridge, Massachusetts, USA
- Voyager Therapeutics, Lexington, Massachusetts, USA

Keonna participated in a 12-week internship at Voyager Therapeutics, a biotechnology company dedicated to developing AAV gene therapies for neurological diseases. Her goals for the internship were to sharpen her problem-solving skills, gain practical experience with molecular and cellular biology techniques, and deepen her understanding of the drug discovery process.

During her time at Voyager, Keonna focused on converting fibroblast cells into neurons, where she handled multiple cell lines, performed cell passaging, and conducted immunocytochemistry (ICC) protocols. To support her neuronal conversion project, she also engaged in bacterial culture and isolation of plasmid DNA necessary for transducing fibroblasts. This involved performing a restriction digest to confirm the integrity of the plasmid DNA, as a quality control step important for the experiment's overall success. To demonstrate that the cells were successfully transduced and had been converted into neurons, Keonna conducted ICC to evaluate their expression of neuron-specific markers. These neurons may provide a useful tool for drug discovery.

In addition to her lab responsibilities, Keonna took the initiative to meet with professionals across various departments, expanding her network and gaining valuable insights into diverse career paths. This experience confirmed her interest in pursuing a PhD and her desire to pursue a career in industry. Moreover, her work at Voyager sparked a new interest in in vitro modeling.

In her final week, she successfully presented her research to the neuroscience group, including senior leaders, and received commendations for her contributions. This internship not only provided Keonna with technical expertise but also deepened her passion for scientific research and shaped her career aspirations.

Chemical Engineering

Sumirah Charles

Sumirah Charles (Saint Lucia)

- STEM major at Sir Arthur Lewis Community College, Saint Lucia (2024)
- Foursquare Rum Distillery, Barbados

Sumirah's primary objectives during her internship at Foursquare Rum Distillery were to gain a deeper understanding of career opportunities within chemical engineering and to apply the theoretical knowledge she had acquired through her coursework in a professional setting. From the outset, she approached the experience with an open mind, eager to immerse herself in every aspect of the distillery's operations. Much of her time was spent in the laboratory, where she quickly adapted to the technical environment and gained hands-on experience with a range of equipment and techniques. The latter included testing cane juice for alcohol content, acidity, and brix levels. She also measured chlorine in the cooling water. This practical exposure allowed her to develop her skills in conducting experiments in a highly reproducible manner while also applying her academic background in chemistry and physics.

Beyond the laboratory, Sumirah got a first-hand look at the entire rum production process from raw materials to the final product and participated in filling barrels with rum for aging. Each day brought new learning opportunities, allowing her to build on her existing knowledge and contribute to various tasks. Working with a team of passionate professionals made the experience even more rewarding, as their enthusiasm and expertise elevated the collaborative atmosphere and strengthened her communication skills. Her time at Foursquare confirmed her passion for pursuing chemical engineering as her career focus. This hands-on experience reinforced her belief that practical application of knowledge is where she thrives, motivating her to pursue her goals within the field with even greater determination.

Chemical Engineering

Michaela Brown

Michaela Brown (Jamaica)

- Upper 6th form, Campion College, Jamaica
- West Indies Rum Distillery, Barbados

Michaela was employed at West Indies Rum Distillery in Barbados as a Quality Assurance Specialist intern. She worked mostly in the Instrumentation Lab, while also helping in the Fermentation Lab. Michaela received distilled and ready alcohol every morning and prepared samples for sensory testing. She diluted the alcohols to 20%, distributed these samples as mixtures into distinct glasses for testing via smelling and scoring for similarity to the standard reference by the panelists.

In the instrumentation lab, the composition of the alcohol was tested using gas chromatography and other methods. Gas chromatography was used to measure the percentage of distinct compounds such as methanol, acetaldehyde, propanol, and isopropanol. Michaela also tested for diacetyl, a natural compound that is a byproduct of fermentation which contributes to the flavor. These results were integrated and recorded into a spreadsheet. The alcohol was then classified to inform the entire plant of the batch's quality for aging or blending purposes. In addition, a potassium permanganate test was required to monitor the bacteria level in the alcohol. This information was particularly important for specific customers. In the Fermentation Lab, Michaela assisted her coworkers by counting yeast, testing for pH and conductivity, and evaluating efficiency of a new machine to measure total sugars.

Lastly, she worked on an independent project, guided by her supervisor, focusing on the water-cooling system at West Indies Rum Distillery. She collected samples of water for testing bacteria levels and identifying their sources, and then authored a report based on the results.

Michaela found the experience to be transformative. The internship increased her confidence, expanded her lab skills, extended her professional network, and taught her about the rum making process. For the first few days, she was timid and very unsure of herself in the lab. After the first week, she became more confident in her abilities and sometimes worked independently. She met and formed connections with amazing women in the lab as well as other workers throughout the plant. Michaela believes the summer internship experience has made her a better student and future scientist.

SPISE 2024

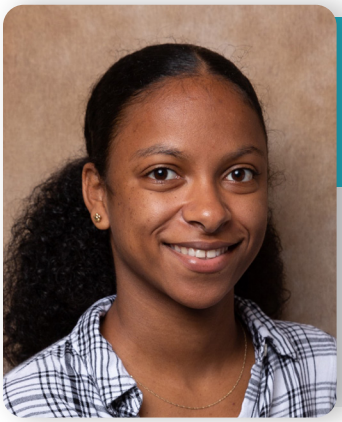
The **Student Program for Innovation in Science and Engineering** (SPISE) is an intensive 5-week residential summer program in science and engineering, offered by the Caribbean Science Foundation for the most promising and gifted Caribbean high school students 16 and 17 years of age. Dr. Dinah Sah and Professor Cardinal Warde are the Directors of SPISE which is modelled after the MITES program at MIT, for which Professor Warde has served as the Faculty Director for 27 years. SPISE students are totally immersed (24/7) in university-level calculus, physics, biochemistry, entrepreneurship, and hands-on projects in computer programming (Python) and electronics. The SPISE environment discourages rote learning and instead teaches students how to focus on understanding and applying the fundamentals to achieve mastery of the material, and thus be able to solve complex problems. Instructors and lecturers include university professors from the Caribbean and the Diaspora (including MIT), and senior management professionals from leading biotechnology companies in the Diaspora. The students also benefit from career seminars by luminaries in their respective fields and receive valuable guidance through workshops that focused on time management, the US college application process and effective CV preparation.

To date, the Caribbean Science Foundation has served a total of 245 graduates, including a class of 20 students in SPISE 2024. The aims of the program are being realized, with SPISE graduates attending top-tier universities in the US, Canada, the UK and the Caribbean, including MIT, Caltech, Harvard, Stanford, Princeton, Yale, Dartmouth, Columbia, Cornell, U Penn, Johns Hopkins University, Carnegie Mellon, Howard, McMaster University, Oxford, and The University of the West Indies, where they pursue bachelor's, master's and doctorate degrees in a range of STEM-based subjects. This achievement could not have been accomplished without your continued support, for which we are extremely grateful.

Further details can be found at *https://caribbeanscience.org/spise/*.

Where are the Interns Now?

We are delighted to feature 2 former CADSTI-NE interns in this newsletter: Tracey Moyston and Shaquielle Dias. Other former interns will be highlighted in future newsletters.



Tracey Moyston

Ph.D. candidate, Biomedical Engineering, University of Pittsburgh, Pittsburgh, Pennsylvania

SPISE 2017 Caribbean Development Bank Scholar
Internships: Cogen Immune Medicine (now Repertoire Immune Medicines), Cambridge, Massachusetts (2019)
Bachelor of Science in Biomedical Engineering, University of Rochester, Rochester, New York (2022)

Tracey Moyston is a 3rd year PhD student in Biomedical Engineering at the University of Pittsburgh where she works under the guidance of Professor Steven Little, whose lab specializes in controlled release and the development of drug delivery systems. Tracey's work focuses on combining their controlled release technology with tissue engineered vascular grafts to prevent obstruction and improve blood flow. Additionally, she is developing a small molecule delivery system for bone regeneration applications.

Tracey was inspired to follow a career path in research following her CADSTI-New England internship experience at Cogen. She applied to the internship program at the end of her first year of college because she was curious about what research in the biotechnology industry entailed. This internship was also her first introduction to research, which then inspired her to continue exploring research at the University of Rochester where she worked on the development of a drug-screening platform. Ultimately, her experience in academic research during her undergraduate studies sparked her interest in pursuing a career in academia.

At her internship, Tracey spent the summer working in Platform Discovery where she was involved with the optimization of the discovery platform for T cell receptor and antigen interactions utilizing single cell sequencing. In that project, she was exposed to various research techniques including peptide production, cell sorting and expansion, and next generation sequencing. During this experience, Tracey was most excited about the brainstorming sessions where she collaborated with senior scientists and applied the knowledge she had gained from her biology classes to propose solutions and design experiments. In the process, she also learned how to work within a multidisciplinary team and acquired other useful skills, ranging from proper data documentation and organization to presentation of results to a scientific audience. From her internship experience, the most important benefit was the invaluable career advice that she obtained from speaking with the senior scientists in the group. It was in following their advice that Tracey chose to explore her interests in biology and to pursue her doctoral studies. At the end of that summer, it was clear to Tracey that obtaining a doctoral degree was essential if she wanted to make significant contributions to her field.

Tracey states "I will forever be grateful to the SPISE and CADSTI-NE teams for providing me with this opportunity and for their continued assistance during my undergraduate and graduate studies which has helped shape my academic journey."

Where are the Interns Now?

Shaquielle T Dias

Ph.D. candidate, Biomedical Engineering, Johns Hopkins University, Baltimore, Maryland

SPISE 2013 Caribbean Development Bank Scholar
Internship: STARS Program at UC San Diego, La Jolla, California (2017)
Bachelor of Science in Medicine, Surgery, The University of the West Indies, Mona, Jamaica (2019)

Shaquielle Dias is a third-year PhD candidate in the Biomedical Engineering (BME) program at Johns Hopkins School of Medicine, where he researches skeletal muscle engineering under the supervision of Professor Warren Grayson. More specifically, Shaquielle's work focuses on neuromuscular interactions between tissue-engineered muscle grafts and the host nervous system and improving functional outcomes after skeletal muscle injuries that are too large to heal independently. He is excited about the potential of this and future translational work as he prepares for a career as a physician-scientist. SPISE and CADSTI-NE have been integral in setting Shaquielle on the career trajectory of his dreams.

Shaquielle's experience in SPISE led to a CADSTI-NE sponsored internship in the Summer Training Academy for Research Success (STARS) at the University of California - San Diego during the summer of 2017. This internship happened at a time when he was very uncertain about his career, having had a rough start in medical school at UWI-Mona. Shaquielle's internship, which also served as a medical school elective, was in the Cartilage Tissue Engineering (CTE) Lab led by Professor Robert Sah. Shaquielle had always wanted to do research in orthopedic bioengineering but did not have this opportunity at UWI, so his excitement was tangible. Shaquielle's summer project was to analyze images of engineered cartilage taken with a novel micro computed tomography protocol developed by the CTE Lab. Every morning for 10 weeks, he waited until the building doors opened and stayed late every evening to analyze data, learn new techniques, and read the scientific literature to learn everything he could about cartilage and tissue engineering. Professor Sah was an excellent advisor who would become a long-term mentor and provided a structured experience that exponentially expanded Shaquielle's skill set in programming, microscopy, 3D printing, tissue culture, data management and analysis, and cartilage biology. Shaquielle's weekly presentations helped him to develop the confidence he now has in delivering research presentations. This summer project led to Shaquielle's first poster presentation at the Orthopedic Research Society Conference in 2018. His internship not only galvanized his enthusiasm for a career as a researcher but also inspired a significant improvement in his outlook in medical school. Shaquielle went on to finish his medical school program and spend a further three years in medicine in Jamaica with his last year as a house officer in Anesthesia and Critical Care Medicine during the COVID-19 pandemic. Despite the immense fulfillment and privilege that he felt practicing medicine, Shaquielle was more excited about becoming a researcher and continued working remotely with Professor Sah after the summer internship had concluded.

Shaquielle started a PhD at the top BME program in the US - Johns Hopkins University, after some failed attempts with graduate school applications, plenty of guidance from his mentors from SPISE and Professor Sah, and substantial perseverance. The SPISE and CADSTI-NE teams have been supportive of every step of the way. The advice Shaquielle received from Professor Sah on extra-curricular courses during medical school ensured his qualification for BME PhD programs, which was further bolstered by his summer internship at STARS. Shaquielle has gained a supportive network of mentors, fellow interns, and SPISE alumni who have become professional colleagues and friends. He will always be grateful for the support he received from CADST-NE and cannot wait to give back to the next generation of Caribbean scholars.

2024 Internship Hosts and Sponsors

Sincere thanks to our partner organizations, who devoted time and resources to plan for, on-board and mentor the student interns.

Host Organization	Location	Company Focus	Student Intern
Atalanta Therapeutics	Boston MA, USA	Biotech company pioneering the use of branched siRNA to treat neurological diseases.	Isabel Matthews
Foursquare Rum Distillery	Barbados	Rum manufacturer with state-of-the-art equipment and systems.	Sumirah Charles
Lens Tec	Barbados	Medical device company that designs, manufactures, and distributes a wide range of intraocular lens implants and lens injection systems.	Maria Malcolm
Ocular Therapeutix™	Bedford MA, USA	Biopharmaceutical company that specializes in the treatment of eye diseases through an innovative hydrogel-based delivery system that provides sustained and localized drug delivery.	Zaria Ferguson
voyager therapeutics	Lexington MA, USA	Biotech company developing life-changing gene therapies for people living with severe neurological diseases.	Keonna Simon
West Indies Rum Distillery	Barbados	Barbados' largest rum exporter, with a focus on high-quality, sustainable practices.	Michaela Brown

Caribbean Diaspora for Science Technology & Innovation New England

Empowering Caribbean youth through science & engineering experiences

Thank You!

CADSTI-NE Leadership Team

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