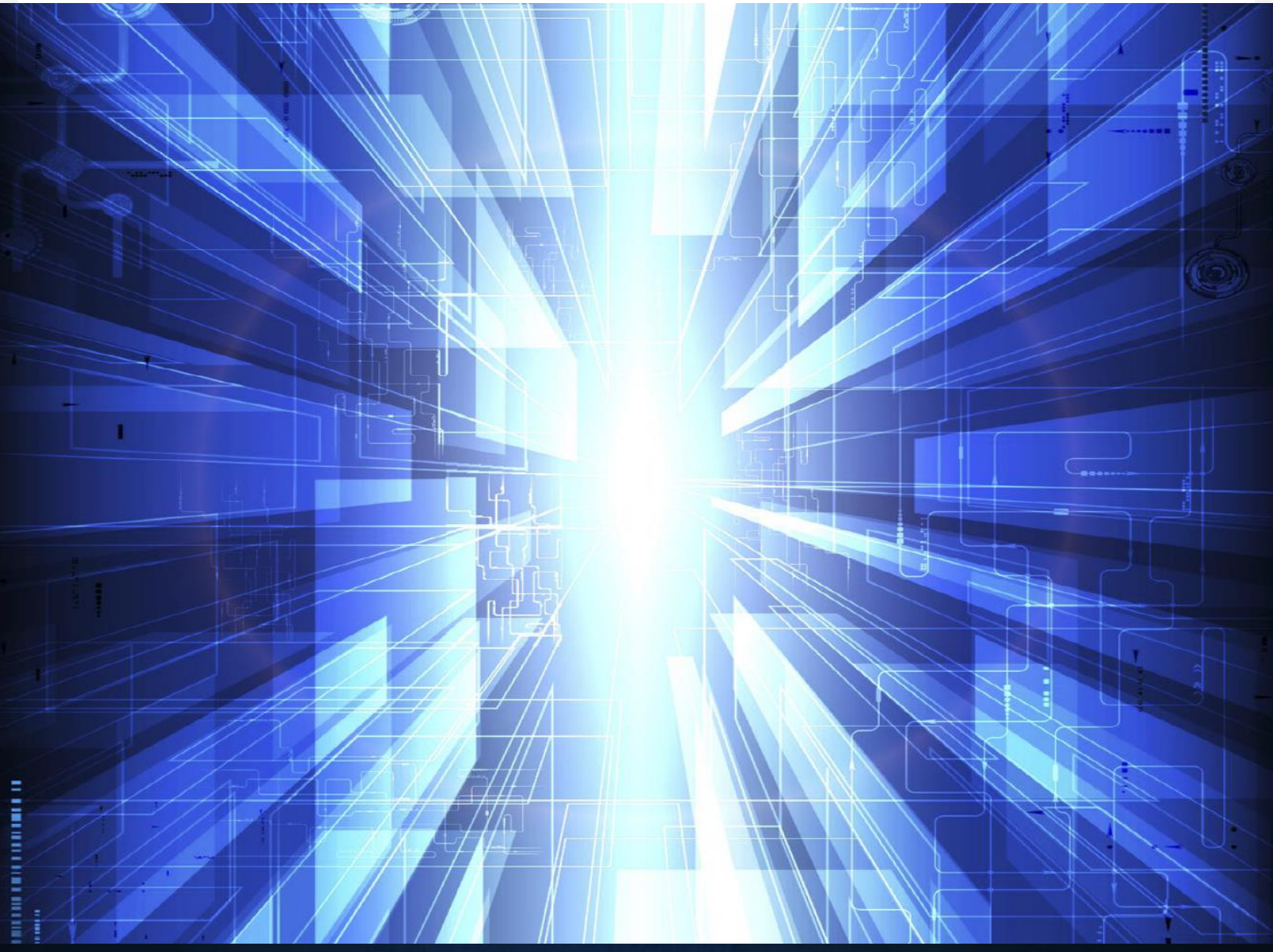
THE UNIVERSITY OF THE WEST INDIES

70th ANNIVERSARY 1948-2018

70 years of Service,
70 years of Leadership



The Faculty of Science & Technology

Building On A Legacy Of Science

Faculty Departments

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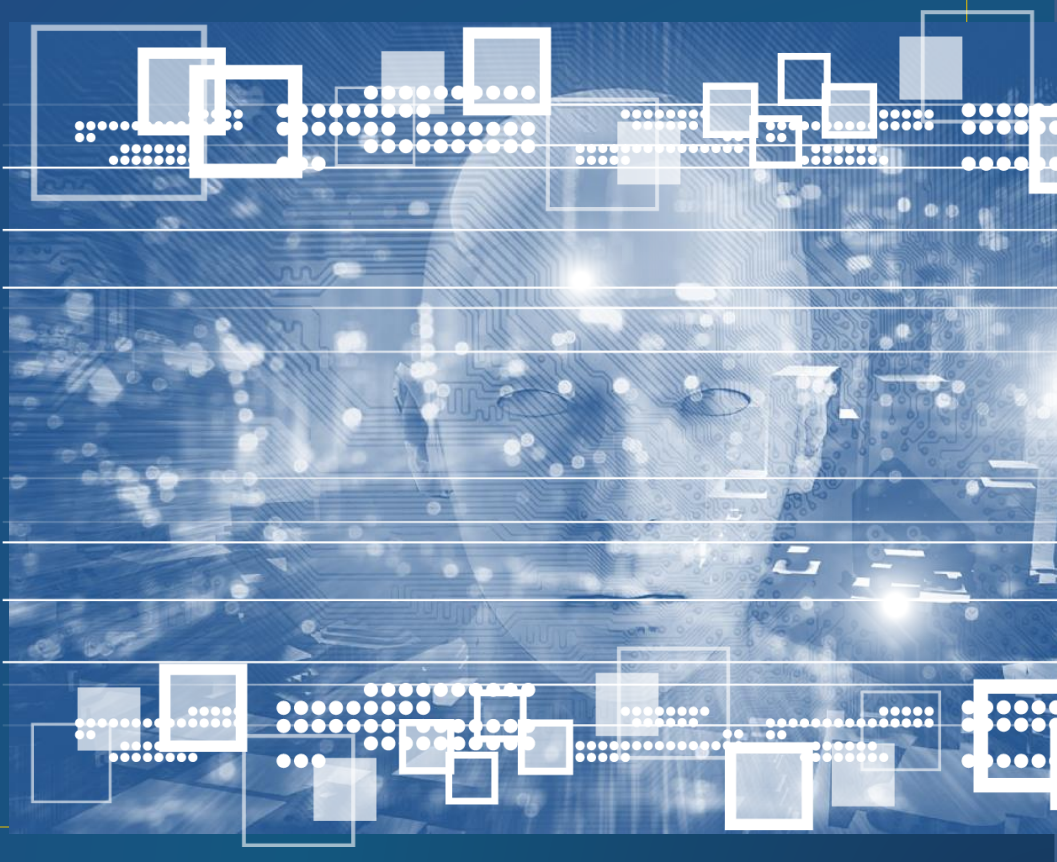


Greetings from the Faculty

Chairperson's Comments

Mrs. Miriam E. Lindo
miriam.lindo@uwimona.edu.jm
Administrative Officer, Dean's Office
Faculty of Science and Technology

The **Graduate Magazine** was conceptualized during the planning of the 9th Faculty Conference in 2013 and the first edition was produced in that year. The focus of the magazine at that time was the research interests of graduate students in the Faculty. This year marks the third anniversary of the Faculty Magazine concept, and this production coincides with the staging of the 11th Faculty Conference to be held April 25-27, 2018.

The current issue of the Magazine is broader in scope than previous editions. This Magazine features how various aspects of the Faculty of Science and Technology have developed through the years. It includes descriptions of historical events and highlights professionals who have served the Faculty, some of whom have achieved excellence, and others who are aspiring to find their space in today's scientific realm. We consider this Magazine to be a significant contribution to the celebrations of The University of the West Indies' 70th anniversary (1948-2018).

One of the earliest faculties to be established at The UWI, the Faculty of Science and Technology began as the Faculty of Natural Sciences in 1950. Subsequently, it has undergone two name changes. In 1996 it became the Faculty of Pure and Applied Sciences and in 2012 it was re-named the Faculty of Science and Technology. Naturally, the change of name signifies the Faculty's commitment to align itself with the strategic direction and mission of the University. The Faculty continues to strive to meet the needs of the local and global communities.

The Faculty has a proud record of accomplishments, achieved through the hard work, commitment and persistence of its staff and students. A number of stalwarts have been nurtured by the Faculty, and many of our alumni have gone on to hold leadership positions in academia, government, and the private sector – locally, regionally, and extra-regionally.

It is my wish that as you browse through the pages you will find something that will bring back memories or make you feel a sense of belonging to the Faculty. To the graduate students whose work is featured in this publication, I hope that your input will help to provide exposure to your research and open funding and collaborative opportunities for you. To all others, may you find useful and treasured information in this publication.

Blessings to you.

GREETINGS FROM THE FACULTY

Dean's Message

Prof. Paul Reese
paul.reese@uwimona.edu.jm
Faculty of Science and Technology

The 11th Faculty of Science and Technology Conference is being held in the year that The University of the West Indies celebrates its 70th anniversary. The theme of this conference is "Science for Society: F.I.T. for Purpose". The acronym signifies the fact that Science is Foundational, Innovative and Translational.

Our institution has witnessed many changes over its seven decades. At its inception it was a college of the University of London with 33 medical students from the region. In 1962 it received its royal charter and became an independent institution. Today the UWI boasts four campuses in seventeen territories, with an enrolment approaching 50,000 students.

The university's five year strategic plan (2017-2022) envisages an institution that is more easily accessible by students, agile in its activities, and closely aligned with our regions' needs. If we are to thrive, these goals must be realized.

One of the goals of the Faculty of Science & Technology is the training of world class leaders in scientific discovery and technological advancement. This can be realized by providing students with the skills necessary to succeed in our modern world. Those at the graduate level are expected to participate in the creation of new knowledge, and one of the aims of this issue is to highlight the work of our research students. However, since our university is celebrating a noteworthy milestone, it has been decided to broaden the scope of the magazine to cover some of the history of our faculty.

We hope that everyone who peruses this publication will find something of particular interest. Happy reading!

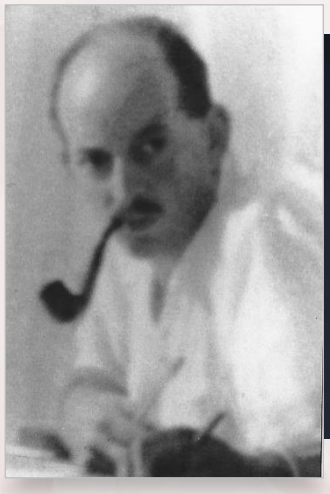
SCIENCE FOR SOCIETY
F.I.T. FOR PURPOSE

Exploring the Legacy

HISTORICAL OUTLOOK

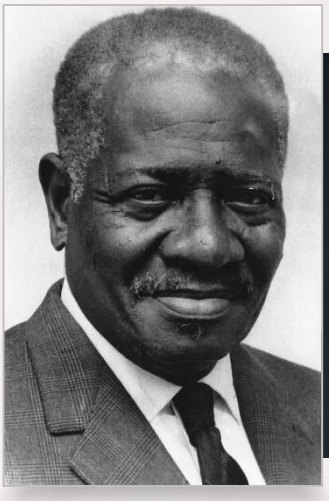
Deans of the Faculty

A Legacy of Leadership and Service



Prof. Geoffrey Francis Asprey

1950-1952

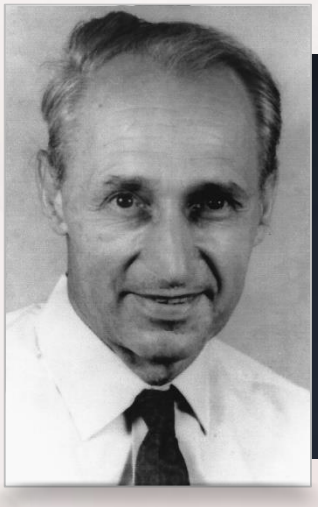


Dr. Francis Haddon Bowen

1952-1954;
1956-1958

Prof. Cedric Herbert Hassall

1955-1956



Prof. Arthur Donald Skelding

1958-1960

Prof. Leonard John Haynes

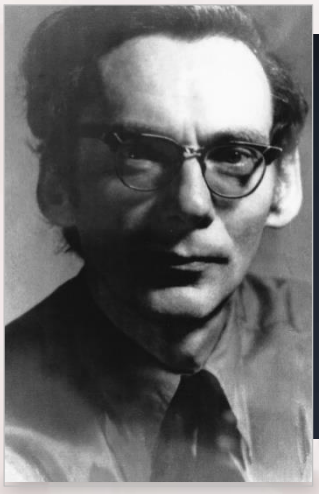
1960-1962;
1963-1965;
1967-1969;
1970-1971

Prof. David Morton Steven

1962-1963

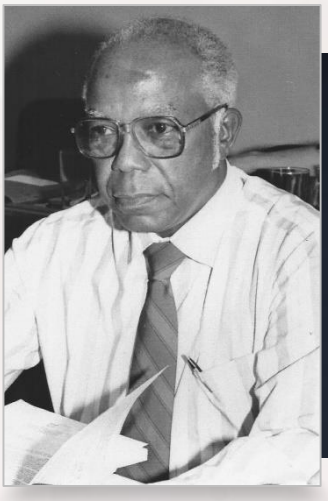
Deans of the Faculty

A Legacy of Leadership and Service



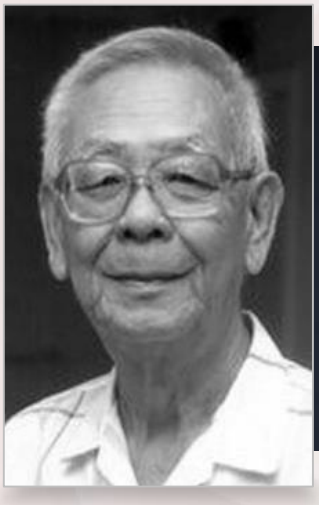
Prof. Raymond William Harvey Wright

1965-1967;
1971-1972



Prof. Leslie Roy Bruce Robinson

1969-1970

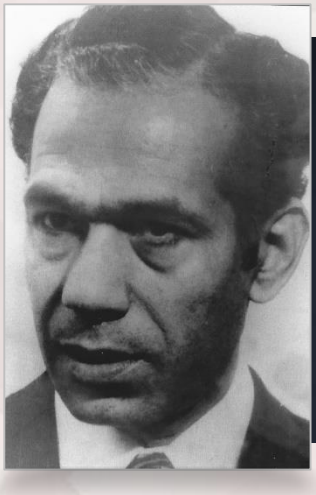


Prof. Wilfred Rupert Chan

1972-1973

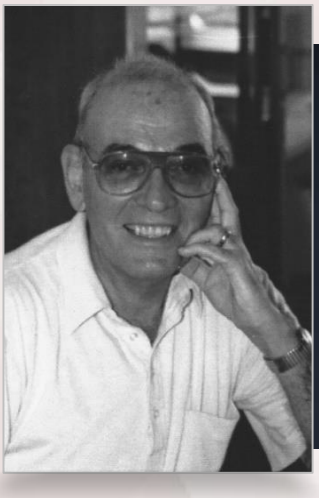
Prof. Ivan Miles Goodbody

1973-1975;
1975-1977



Prof. Girgis Hanna Sidrak

1977-1979

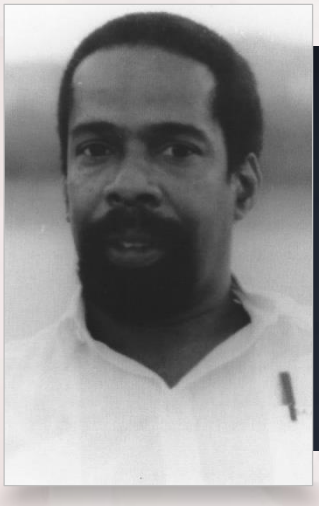


Dr. Martin Gottfried Richard Aub

1979-1982

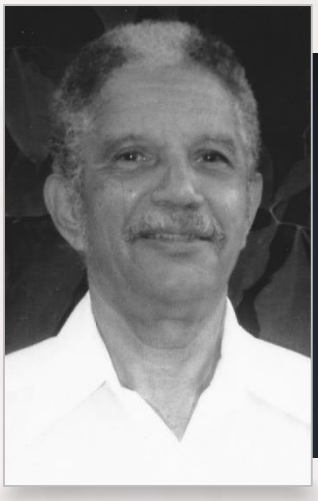
Deans of the Faculty

A Legacy of Leadership and Service



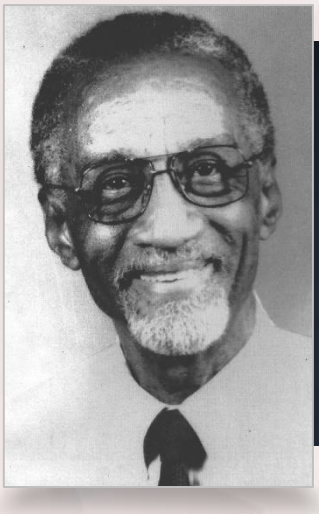
Dr. Lloyd Barrington Coke

1982-1984;
1984-1985



Prof. Kenneth Eugene Magnus

1985-1993

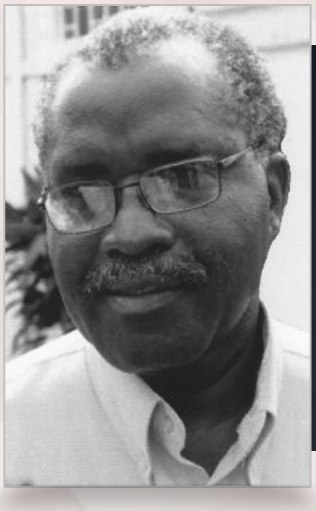


Dr. Michael Neville McMorris

1993-2000

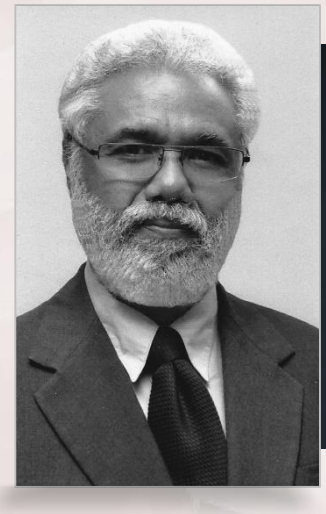
Prof. Ronald Edward Young

2000-2008



Prof. Ishenkumba Albert Kahwa

2008-2013



Prof. Paul Bancroft Reese

2013-Present

Faculty Facts

The 50's

- Teaching in the Science Faculty commenced at Mona in 1949 with students in the Departments of Botany, Chemistry, Mathematics, Physics, and Zoology.
- Temporary laboratory and research spaces were constructed in 1948. Tenders for building in the Science Block were solicited in 1949. In 1951 there were temporary setbacks to the construction of the building due to damages experienced in the 1951 storm, Charlie.
- 

Faculty of Natural Sciences under construction in 1951. View is from Physiology (now Science Lecture Theatre III) looking towards Botany (now Life Sciences Block A).
- Fifteen students in the Faculty of Natural Sciences were among the first batch of graduates at the first graduation ceremony of the University College of the West Indies in January 1953.
- The first M.Sc. degree in the Faculty was instituted in 1953.

The 60's

- 
The Port Royal Marine Lab was established in 1955 by Prof. David Steven and Ivan Goodbody to enable the then Zoology Department to focus on the study of Marine Biology as one of the main activities. Prior to this, the facility had been a rented premise at Morgan's Harbour.
- The UWI Geology Department was founded in 1961, and initially occupied the old wooden building near to the Senior Common Room. This was the same building where the first chemistry lectures in the fledgling University College of the West Indies were held in the late 1940s and early 1950s.
- The De la Beche building was built in 1964 to re-house an expanding Geology Department.
- The first cohort of Geography undergraduates entered the University in October1965. The students were taught by two newly appointed lecturers, L. Alan Eyre and Ann Norton.
- 
DBML was founded in 1965 by Professor Thomas F. Goreau (and his wife Dr. Nora Goreau). In 1968, Kaiser Bauxite Company donated the land for the current facility which was constructed by the University of the West Indies, Mona (with funding from the Wolfson Foundation and CIDA) as the UWI's research arm on Jamaica's north coast.
- By 1969, the Physics Department primarily catered to first year Medical students, offering preliminary science and premedical courses at the GCE Advanced level.

Faculty Facts

The 70's

- Administratively, Geography was a sub-department within the Geology Department, but became a separate department in the Faculty of Natural Sciences in 1971.
- In 1974, Wilma Bailey achieved the distinction of being the first PhD in Geography. She went on to become the first Professor of Geography (in 2001).
- In 1977, the Sub-Department of Computing Science was established in the Department of Mathematics which taught N3 Computing for the first time to the 13 registered students.
- The Central Radioisotope Laboratory was inaugurated in Chemistry in March 1977, performing bauxite analysis for the Jamaica Bauxite Institute .
- Barry Wade's report on water quality, benthic ecology, pollutant abatement and harbour improvement of Kingston Harbour was published in July 1977.
- 

  The obelisk, which stands on the lawn in front of the De la Beche Building, was erected in January 1984, a birthday gift to the then Geology Department from the Geological Society of Jamaica to commemorate 21 years of teaching at the UWI (1961 to 1982). The idea was conceived by Parris Lyew-Ayee, it was designed by Dr. Trevor Jackson, the then Head, and the rocks that comprise the obelisk were collected by several graduates of the department. It was unveiled in February 1984 at the GSJ's Annual General Meeting by Pro-Vice Chancellor Professor Gerald Lalor and Miss Cathy Levy, Miss Jamaica World (1983). The obelisk represents a stratigraphic record of Jamaican geology and is composed entirely of rocks found in Jamaica.
- 

  The Biotechnology Centre was opened in 1989 with the mandate for teaching and training in order to encourage biotechnology-based enterprises.

The 90's

- In 1996, the Faculty of Natural Sciences was renamed the Faculty of Pure and Applied Sciences ; the current title of Faculty of Science & Technology was consigned in 2012.
- Also in 1996, the combined Department of Geography and Geology was created as part of the administrative reforms conducted under the regime of Vice Chancellor Alastair McIntyre. Similarly, the Department of Life Sciences was created from a merger of the Departments of Botany and Zoology. A third merger was that of the Departments of Mathematics and Computer Science.
- The completion of the UWI/IDB development programme for Science & Technology in 1997 resulted in enhanced facilities for several departments: buildings, lecture theatres, computers and computer rooms, laboratories, teaching aids, vehicles, boats, a standby generator, cameras, as well as oceanographic and other field equipment.
- 1999 saw the Faculty moving to online student registration.

HISTORICAL NOTE

Cedrick Herbert Hassall

December 6, 1919- September 5, 2017

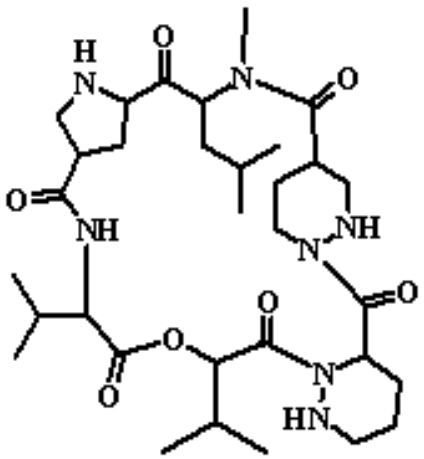
Cedrick Hassall, who obtained his PhD in Microbial Chemistry at the University of Cambridge, was employed by the University of the West Indies (UWI) Mona, as the first Head of Department of Chemistry in 1947 where he gave the first lecture in the university.

While at the University, Cedrick Hassall instituted the Natural Products in Medicine where he did his research in natural products and supervised the very first PhD awarded in 1952. As his research continued, he discovered a new soil organism, "*Streptomyces jamaicensis*" which produced a novel compound named monamycin(1), an antibiotic. Monamycin was later utilized in the development of the drug cilazapril and is still utilized in the treatment of hypertension.

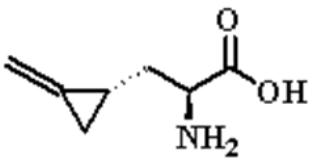
Cedrick Hassall then directed his attention to *Blighia sapidia* which is known to the common man as ackee. *Blighia sapidia* is an exotic fruit which came from West Africa and is widely consumed by Jamaicans and the Caribbean diaspora. This fruit takes its place in Jamaica as a culinary delicacy and our national dish: Ackee and salt fish. However, in the 1950's this fruit was suspected to be linked to the vomiting sickness that was experienced by persons who consumed the fruit. At the time there was no conclusive evidence that supported this claim. When Cedrick Hassall did his investigations into the chemical constituents of this fruit, he isolated Hypoglycin A (2) and Hypoglycin B (3). Further examination of these compounds proved that they were toxic compounds, and this evidence supported the claim that unripe ackee is poisonous and was indeed the cause of the vomiting sickness experienced by the persons who consumed the unripe fruit.

Cedrick Hassall also assisted the industries within the West Indies by solving various problems. In addition, he started a Diploma in Chemical Technology (precursor to Chemical Engineering) and arranged a course for AMICHEM E which aided the sugar industry.

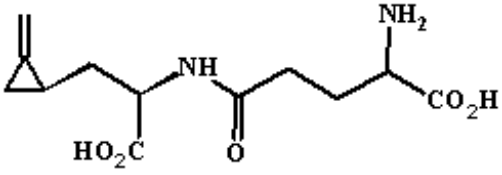
Cedrick Hassall was a pioneer of his craft, even though he has now passed, we celebrate his memory and continue his legacy.



Monamycin (1)



Hypoglycin A (2)



Hypoglycin B (3)

HISTORICAL NOTE

The rediscovery and conservation of the endemic Jamaican Iguana (*Cyclura collei*)

Extracted from Wilson et al. (2016)—25 years of conservation effort for the Jamaican Iguana

Historical perspective: 1600s to 1990.—The endemic Jamaican Iguana (*Cyclura collei*) was once common along the coastal plains and hills of southern Jamaica (Sloane 1725), but was considered rare or absent on the mainland near the end of the 1800s, presumably due to a combination of over-harvesting, habitat loss, and the introduction of non-native mammalian predators such as the Indian Mongoose (*Herpestes javanicus* [=auropunctatus]) (Woodley 1971, 1980; Vogel et al. 1996; Grant et al. 2013). The iguana was considered extinct after a small population disappeared around 1948 from Great Goat Island, located off the western side of the Hellshire peninsula, apparently due to the introduction of the mongoose from the mainland in the mid-1920s (Lewis 1944; Woodley 1980).

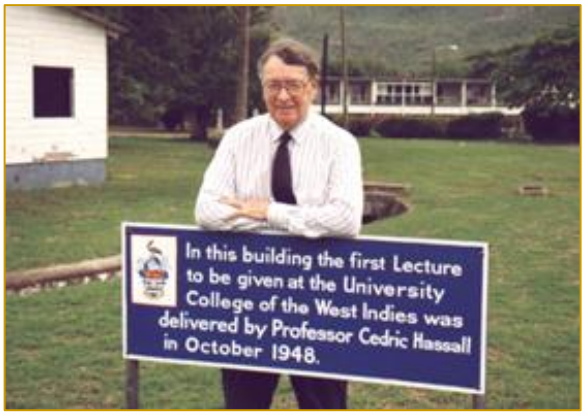
The endemic Jamaican Iguana (*Cyclura collei*) at a communal nest site in the Hellshire Hills in St. Catherine

The species was re-discovered in the Hellshire Hills in 1970 (Woodley 1971, 1980), and again in 1990 (Alberts 1993; Vogel et al. 1996). Those re-discoveries represented the only records of the species on the mainland of Jamaica in the 20th century. The 1970 re-discovery, the retrieval of a specimen killed by a pig hunter's dog, went largely unnoticed by local and international scientific and conservation communities. This was perhaps unsurprising. Locally, Jamaica lacked a resident herpetologist, and lizards are generally loathed by most Jamaicans. Furthermore, no environmental lobby or environmental NGO existed at the time in Jamaica, and efforts to combat the "global extinction crisis" were in their infancy.

In contrast to the quiet and largely ignored 1970 re-discovery, the 1990 re-discovery generated enormous local and international interest, and galvanized a successful recovery effort that continues today (Alberts 2000; Vogel et al. 1996; Wilson 2011). The 1990 re-discovery was different for two reasons. First, Jamaica had a resident herpetologist at the time, in the late Dr. Peter Vogel, then a Lecturer in the Department of Life Sciences, at The University of the West Indies, Mona (UWI). Second, the period 1970–1990 witnessed an international awakening to the global extinction crisis, formalized by the genesis of a new discipline, conservation biology (Soulé 1986).

Following the 1990 re-discovery, Dr. Vogel and other local stakeholders formed the Jamaican Iguana Research and Conservation Group (JIRCG). With considerable technical and financial support from international partners, the JIRCG (re-named in 2006 as the Jamaican Iguana Recovery Group [JIRG]) implemented emergency actions (primarily nest site protection and diversion of charcoal burners away from the critical nesting areas) that likely prevented an otherwise certain extirpation of the remnant population. Also crucial, the nucleus of iguanas for a captive programme for breeding and headstarting was collected between 1991 and 1993. Undeniably, 1990–1993 was a most critical period for the Jamaican Iguana (Vogel et al. 1996). Subsequent conservation activities have focused on recovery efforts for the remnant population, securing protection for the Hellshire Hills, and establishing a reintroduced population on the Goat Islands (Wilson et al. 2004; Wilson 2011; Grant et al. 2013).

From the Archives



Prof. Cedric Hassall at the site of the first lecture hall of the UCWI (now Founders Park).

Physics Laboratory

Department of Physics under construction, 1951

Chemistry Laboratory

Chemistry 1952

From the Archives

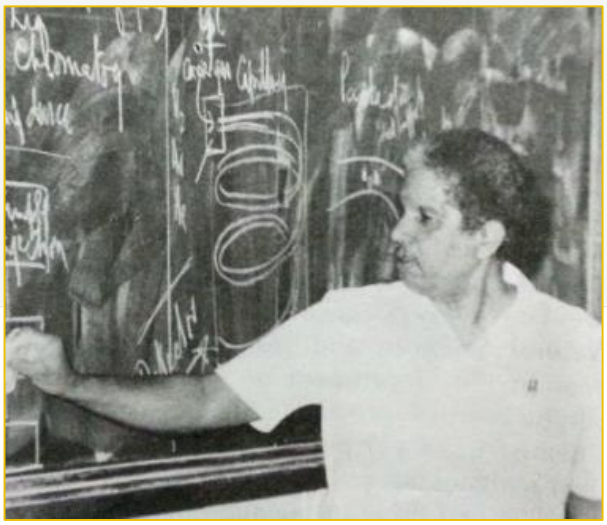
Dr. Neville McMorris and Prof. Tara Dasgupta, 2nd from left, at the opening of the Tanaud Research Laboratory

Professor Kenneth Magnus speaks with Dr. Nelson Mandela on his visit to Mona, July 1991

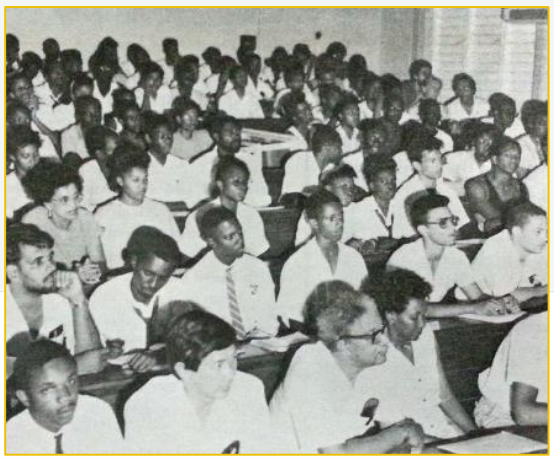
Dr. Alfred Sangster, President CAST (left) in discussion with Professor Kenneth Magnus, Dean of the Faculty of Natural Sciences (right) and Dr. Neville McMorris at the launching of Dr. McMorris' book "The Natures of Science" at the University Bookshop. March 1, 1990

What a lovely Chemistry Party!

The late Dr. Lloyd Coke, (Botany) Dr. Dunbar Steele (Zoology) and host Prof. Kenneth Magnus



Dr. Kenneth Magnus, Head, Department of Chemistry, advising 'A' level students at a workshop organized by the Department on April 4, 1984.



Supporting Faculty Outreach to Schools. Prof. Kenneth Magnus with Physics Staff Member Dr. Patrick Chin and High School Teachers at the closing ceremony of the Grace Foundation sponsored workshop in the Physics Department, Mona. (1990).

From the Archives

From top left: Dr. Neville McMorris, Dr. Madge Greenfield, Prof. Trevor Jackson, Ms. Winsome Wright and Mr. Rafi Ahmad.

Gerald Lalor, Wilfred Chan, Cedric Hassall, Alfred Sangster, Owen Minott, Kenneth Magnus (l-r)

Prof. Lancashire, Dr. Eric Garraway, Dr. R.D. Steele and Dr. Karl Aiken at the Faculty Conference

Dr. Dunbar Steele, Head, Department of Zoology (standing) at the opening of Aquaculture Laboratories at Port Royal Marine Lab. Seated (L-R): PVC Prof. Gerald Lalor, Mr. Jonathan Rodwell, Acting Delegate, Delegation of the Commission of the European Communities and Vice Chancellor Mr. Alister McIntyre

Presentation ceremony to officially mark Alcan's commitment to financing a project on the retention of soda in alumina held at the University in March 1987. In attendance were the Acting Vice-Chancellor, Prof. L.R.B. Robinson; Alcan's Director of Technology, Mr. Carl Strachan; Dr. A. M. Greenaway, Project Supervisor and Mr. MIchael Coley, research student in the Department of Chemistry.

Professor Kenneth Magnus listens intently to Pro Vice Chancellor Leslie Robinson replying to speeches in his honour at a luncheon marking his retirement (October, 1991). Present also in the photo are Dr. Madge Greenfield and Pro Vice Chancellor, Professor Gerald Lalor.

Dr. Willard Pinnock, Dr. Keith Pascoe, Prof. Ralph Robinson and Dr. P.V. Devi Prasad at the Faculty Conference

Prof. Phyllis Coates-Beckford also at the Faculty Conference

Faculty Professors

BIOTECHNOLOGY CENTRE

Helen Asemota
Marcia Roye

CHEMISTRY

Mohammed Bakir
Wilfred R. Chan
Tara P. Dasgupta
Henry A. Ellis
Cedric H. Hassall
Leonard J. Haynes
Yvette A. Jackson
Helen Jacobs
Ishenkumba Kahwa
Gerald C. Lalor
Robert J. Lancashire
Stephen R. Landor
Kenneth E. Magnus
Willem Mulder
Paul B. Reese
Kenneth L. Stuart

COMPUTING

Daniel Coore

GEOGRAPHY AND GEOLOGY

David Barker
Wilma Bailey
Stephen Donovan
Trevor Jackson
Simon Mitchell
Edward (Ted) Robinson

LIFE SCIENCES

Geoffrey F. Asprey
Ian R. Ball
Noureddine Benkeblia
Phyllis Coates-Beckford
Brian Freeman
Ivan Goodbody
Thomas F. Goreau
Ajai Mansingh
Victor Meyer-Rochow
Norman Millott
Ralph Robinson
David M. Steven
Arthur D. Skelding
George H. Sidrak
Paula Tennant
Dale Webber
Mona Webber
Byron Wilson

MATHEMATICS

Johnathan D. Farley
Girija Jayaraman
Leslie R. Robinson
Alexandra E. Rodkina
Wen-bin Zhang

PHYSICS

Anthony Chen
Geoffery S. Kent
John Lodenquai
Michael Taylor
Mitko Voutchkov

ENTERPRISING THE LEGACY

THE BUSINESS OF SCIENCE

The Business of Science

Dr. Lyndon Johnson

Technosol Limited

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http://www.technosolltd.com/products/
info@technosolltd.com

Dr. Lyndon Johnson is very passionate about his Business of Science. As a PhD graduate at the Department of Chemistry, the UWI, he specialized in research in Natural Products and developed an interest in the medicinal aspects of certain plants such as the "antidote cocoon", bissy (cola nut) and guinea hen weed to name a few.

From humble beginnings, he was able to support his educational pursuits through the use of a scholarship obtained from the Scientific Research Council (SRC). Later, he joined the team of the SRC and was instrumental in the creation of the Natural Products Unit and the Research and Development Units at that institution.

Dr. Johnson's transition from academia to entrepreneurship was fuelled by his personal commitment to look at the application of science to economic development and its impact on the national impact. His determination to play a part in employment development and engage in beneficial land use was equally important. He developed the drive to go into business as both the potential and the resources were available, his dream being to spread the benefits of his academic pursuits.

Describing himself as "Nationalistic" and "Jamaican to the core", Dr. Johnson recalls that even though he had the opportunity to migrate to "greener" pastures, he decided to stay in Jamaica and be a "First class citizen" in his home country, Jamaica,

Dr. Johnson relates that there are a lot of raw materials available in Jamaica with economic potential. In organic farming for example, there is a need for natural pesticide, reducing the use of chemically engineered products. He also states that the market is expanding for essential oils, culinary herbs and spices, and for materials used for natural colouring and flavourings. He lists materials such as pimento oil, lemon grass, ginger, coffee, bitterwood, logwood plant, and the annotto plant as resources that Jamaica has at its fingertips.

A by-chance event gave Dr. Johnson the push he needed to find a niche market as at one point there was a shortage of peppermint oil on the market. He used this opportunity to begin the distillation of some of this oil, but later realized that it could not be used for its initial purpose as it needed some additional components to meet the export requirements.

In 1993 Dr. Johnson began the commercial production of essential pimento leaf oil, and Technosol was founded. The business was fully operational, and was strengthened by the acquisition of a property in Braco, Trelawny via a leasing arrangement. The facility was used for distillation.

continues

The Business of Science: Dr. Lyndon Johnson

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Other persons who were instrumental in the early development of the company were Dr. Thompson, Dr. McLean, and Dr. Simpson.

Technosol Ltd. is currently one of the largest manufacturers of essential oils in Jamaica. They produce essential oils and hydrosols for use in flavours, fragrances, cosmetics and aromatherapy products.

The company obtained funding from an US Aid Development project. Additionally, there was financial backing from persons who were interested in that aspect of essential oil production, minor personal loans, and support from the EXIM Bank.

Dr. Johnson states that the survival of the company has been due in a large part by his willingness to understand the difference between being an employer and an employee. Additionally, being flexible and dynamic is key, especially in terms of going into the "nook and cranny" of rural Jamaica in order to source raw material. He notes too that as a result of the company being versatile, it was able to respond to a downward trend in the essential oils fragrance market and it could focus on the essential oils flavours as an alternative. Building networks with market vendors and individuals in the rural communities also helps with the sourcing and collection of samples.

The company exports approximately 92% of what it produces. Its client base is mainly US –based companies, however, it also has markets in Europe and Canada.

Dr. Johnson hopes to keep expanding in the essential oils market, and by and large has acquired a factory in Trelawny and an approximate 85 acres of farmland in St. Elizabeth, where pimento and lemongrass are grown, and other crops will be grown according to the outlook for the market. He looks forward to the company's expansion into the retail market with broader focuses such as rubbing alcohol with pimento oil, a sinus-friendly air freshener blend, and a hair tonic consisting of castor oil, olive oil and essential oils.

The Technosol team has received a number of awards including their contribution to the Agro Industry. They have also been a regional winner for the NCB Nation Builder Award (2008). Additionally, one of their spin-off companies has won the Observer's best new product of the year award.

"God has been good", is the praise given by Dr. Johnson, when recounting his acquisition of a factory with lots of equipment coming from that journey. One of his major achievements is being able to become an employer instead of an employee. He is grateful that he has managed to live his dream of isolating and marketing Jamaican oils. The ability to be able to pay for his children's education, one of whom is a medical doctor and the other is a Marketing student at the UWI, to date is his proudest moment.

Dr. Johnson recognizes that the company has a corporate responsibility to society and as such he is involved in the SRC Science Competition. He also focuses on community level projects that help to teach students (at all levels) and at risk youths about the benefits of culinary and medicinal herbs, as well as the processing and uses of essential oils.

The Business of Science

Dr. Charah Watson Francis

KIHARA Cosmetics

Contact:
www.kiharacosmetics.com
via whatsapp @ 1876-3053139

Dr. Charah Watson Francis is a young scientist and entrepreneur, mother and wife. A graduate of the Faculty of Science & Technology, she has been in the Business of Science for some time.

Like many persons, Charah had issues with her hair, skin, and nails which caused her to feel self-conscious or insecure. She indicated that she struggled for years with dandruff, and was at a point where she did not want to be seen because of how severe her condition was. She tried numerous products on the market, but nothing worked. She states that the problem was that those products were not developed for her hair type or their use was not practical for her lifestyle, therefore they were ineffective as well as very expensive.

Having studied Natural Products Chemistry, and being trained in cosmetics product development by her then research supervisor, Dr. Trevor Yee, she started working on a solution to manage her dandruff. In 2010 she started formulating numerous versions of a Hair and Scalp Treatment Oil that was eventually perfected and yielded a product that essentially cured her dandruff. Later in 2015 after much encouragement from her family and friends she started the company KIHARA Cosmetics to develop products that would prove beneficial to persons, who like her, were struggling with the health and beauty of their hair, skin, and nails. Through KIHARA Cosmetics she hopes to provide practical, affordable and effective treatment solutions for common issues affecting persons. She also hopes to inspire and encourage self-love and acceptance of one's self, looking and feeling beautiful the natural way.

KIHARA Cosmetics is a Jamaican beauty and wellness company that develops all-natural hair, skin and nail care products from indigenous Jamaican plants and extracts. The Company was officially started in 2015 by Dr. Watson Francis, a well-established and respected research scientist, natural product chemist and product development specialist. Charah first started working on the products that eventually formed the KIHARA Cosmetics line of products in 2010, while completing her PhD in Natural Products/Organic Chemistry at the University of the West Indies. The company was established in 2015 as a self-funded venture, and has a staff complement of eight part-time employees.

Currently, the cosmetic line features 5 different product categories; Hair care Solutions, Body Products, Face and Beard Care, Nail Care, and Lip Conditioners and Conditioning Lip Tints. KIHARA Cosmetics believes in quality and vow to never ever compromise quality to meet a bottom

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The Business of Science: Dr. Charah Watson Francis

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line. The current line of products is not at all exhausted as the company is continually developing new products that can fit into the category of wellness and realness!

According to Dr. Watson Francis, her inspiration for the business comes from many places and is influenced by many persons. Her first inspiration came from her family, more specifically her father, Audley Watson. She notes that through his ways, he taught her the value of self and the importance of believing in something and thinking beyond her present circumstances. His pride and confidence in her and her siblings have always caused them to aim higher. She also said that she has been inspired by her circumstances to create value and solutions to common problems that plague persons just like her.

Trained to the highest level in her profession as a chemist, she is of the belief that as a Ph.D. graduate whatever she does must be impactful on a large scale. Meaning that she must either be solving a problem affecting the society, or creating solutions that can bring about economic prosperity or both. With the skills and experiences, she has garnered over the years as a natural products and formulation chemist as well as knowing that as much as 1 in 2 adolescents and adults suffer from dandruff, acne and other skin, hair and nail conditions, she thought it best to put her skills to use and develop solutions that were practical, affordable and effective.

When asked what her proudest moment is, she relates that there were many proud moments, but that one thing that they all had in common was that they involved a customer/client giving a feedback on one of the products that they had been using. One example came from a colleague of her sister who had a teen son. Her son had an extremely flaky scalp that itched like crazy. He has been to several dermatologists and had been prescribed several treatments, none of which have been effective. Her sister introduced Diana to the Hair & Scalp Treatment Oil which contains Tea Tree and Neem oil amongst other key essential oils, and within a week of using the product her son's scalp had significantly cleared up. The itch was gone and after two months his scalp was free of flakes. She says that she can still remember the hug the customer gave her and the smile on her face when she was relaying what had happened with her son's scalp. Dr. Watson's sister, is one of her biggest supporters and brings in a significant amount of referrals to the company.

Through the work done with KIHARA Cosmetics, Dr. Watson Francis was selected as a participant in the Young Leader of the Americas Initiative (YLAI 2017) Professional Fellow. She has been a part of the winning team for the National Innovation Award 3 times (2010 with her PhD studies, 2014 and 2016 with work done with Bio-Tech R&D Institute), and was named the SRC Young Scientist and Technologist in 2012. She also received a Year of Chemistry International Award and a Third World Academy of Science Young Scientist award in 2011.

KIHARA Cosmetics is committed to developing practical, affordable and effective products to enhance beauty naturally. They strive to use the business to inspire and encourage self-love and acceptance by presenting positive images representing the diverse beauty of nature and mankind. It is the Company's vision to be a world-renowned health, beauty and lifestyle brand for high quality, innovative, all natural and impactful solutions designed to enhance beauty naturally. The products are created locally and are available in several retail locations or both locally and internationally via direct ordering through social media. While the lines of products are suited for all, clients are mainly females between 16 and 40 years old with a very discerning taste for high quality and functionality in their products..

The Business of Science

Ms. Valrie Grant, MSc, GISP

GeoTechVision

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GeoTechVision started in November 2008 as a full service Geospatial Information Sciences focusing on "Delivering Value through Innovative Solutions!" It differentiated itself by providing customized solutions to match our clients' business needs. This was in response to what I recognized as a need particularly among government agencies and utility companies.

At the time I had worked for over 8 years as a geospatial analyst, government employee and Spatial Technologies consultant for a wide range of public and private organizations in the Caribbean and recognized that spatial intelligence could offer tremendous benefits to governments and businesses alike but it was not being fully utilized. I also realized that education and awareness in this field would be critical in helping decision makers understand the value of Geospatial Sciences. Geospatial Information is one of the critical elements underpinning decision-making in addressing some of our most enduring problems – Economic Development, Environment and Resource Management, the problem of Climate Change and Disaster Management.

Although my mother died 5 years prior to my establishing GeoTechVision, much of my inspiration came from her. She was one of the strongest, most determined and resourceful woman that I knew and she always encouraged us to pursue our dreams. I still reflect on my many conversations with her and the time we spent together and every time I still learn many valuable lessons and I am inspired to make a valuable contribution and just to live a great story.

Science greatly impacted the formation of GeoTechVision as for me the "S" in GIS represents the Science and being a Science Student this was important to me. Science is all I knew but always had a strong entrepreneurial spirit – this marriage is what created GeoTechVision. Our aim is to use scientific methods to answer questions and draw conclusions while using geospatial sciences as a bridge between the human and physical sciences. Today we are at the edge of "Where" and the Science of Where is what drives our business.

While our efforts in achieving our goals have been largely successful, the journey was rife with challenges including overcoming an illness 4 months after starting GeoTechVision. At the time I had no staff and operated from a Virtual office. I underwent a

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THE BUSINESS OF SCIENCE: MS. VALRIE GRANT

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major medical procedure which meant that GeoTechVison was put on hold for about 6 months. During my recovery, I used the time to write proposals, build relationships and form alliances and was back in the Caribbean building GeoTechVision in September 2009. This meant personal finances earmarked for the business was diverted to medical expenses. While this was a significant setback, I was determined to succeed although this meant growing at a slower pace. This situation called for resilience, drive, tenacity and creativity in using the limited resources available at the time.

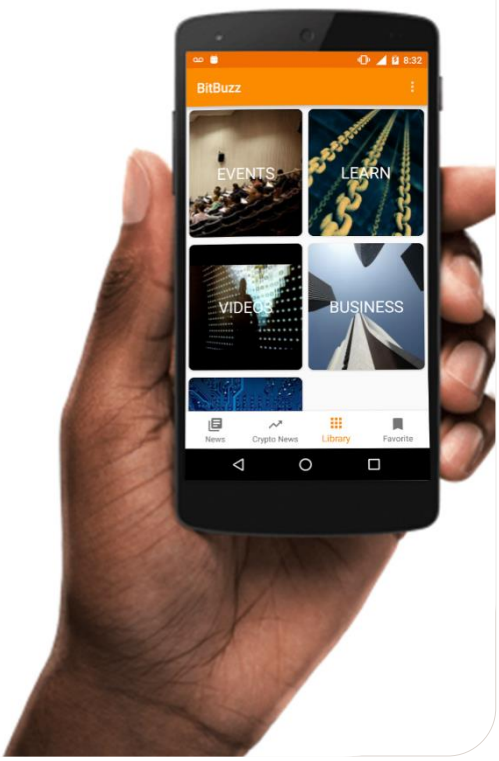
Access to financing in the earlier years was also a major challenge. There was one situation when I had US$1.5M government contract in hand but was unable to obtain the necessary financing through a bank. We managed to implement the project successfully in spite of our financing challenge.

These challenges provided significant opportunities for growth and, today, GeoTechVision has an extensive reach, operating in 15 territories across the Caribbean. We also have engagements in Kenya and in the Pacific region. We have been assisting government and corporate entities develop data driven geospatial solutions to address organizational challenges and meet corporate goals. We are very involved with establishing Enterprise Geographic Information Systems, providing GPS and Mobility products and solutions, as well as marketing our own "GeO" brand tablet. Our ICT focused Services and Solutions to include E-learning solutions, blockchain applications, mobile applications.

We consider Human Capacity Building as being very critical - right from the classroom to the work environment. Hence, our Classroom Management Solution and our strong focus on Training and Development in all our engagements. Our other consulting services include Project Management, Information Security Advisory, Process Audit and Assurance, Business Analysis and Enterprise GIS solution planning and Implementation.

The accomplishments of our organization have been recognized through various accolades including the University of the West Indies (UWI) Première Leadership Award (2000), the Jamaica GIS Entrepreneur Award (2012), The URISA Caribbean Chapter Leadership Award (2012), the prestigious National Commercial Bank's "Women in Business" Award for 2013 in Jamaica. I was awarded the Business Excellence Forum (BEF) 2014 Female Entrepreneur of the Year and is also the Jamaica Chamber of Commerce (JCC) Young Entrepreneur of the Year 2014. I also won the Commonwealth Woman Entrepreneur of the Year Award 2015 and Georgetown Chamber of Commerce & Industry (GCCI) Young Business Executive 2016. Most recently, I was awarded UTech World Class Women Entrepreneur award 2017 and Rusea's Old Student's Association Distinguish Alumni Award 2017.

GeoTechVision is also the recipient of the Caribbean Exporter Award – Excellence in Services Export (2014), Jamaica Chamber of Commerce (JCC) Best of Chamber, Small Category (2015). GeoTechVision is also the InBIA's 2016 Outstanding Software/IT Incubator Graduate Company of the Year. GeoTechVision was featured in several industry Magazines including CIO Review 20 Most promising Companies to Watch.



The Business of Science: Ms. Valrie Grant

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While I am grateful and encouraged by these accolades, I am a firm believer in service to society. Accordingly, I consider Human Capital Development to be the most critical factor in economic development. Learning environments are therefore the most important avenue to promote human capital development. The social responsibilities of my organisation focus on promoting programmes in schools (through our "GIS in Schools" project), camps for students (summer camps that provide practical GIS technology exposure) and internships for tertiary students - that provide working experience in Geoinfomatics.

Over the past 5 years we have also provided a scholarship to pursue programmes in Geospatial Sciences. We are sponsors of the Annual GIS day event in Jamaica and other Industry events. With our partners MicroSurvey Inc, we have donated US $750,000 worth of geomatics software to the Faculty of The Built Environment, University of Technology. I also volunteer on several committees locally, regionally and internationally, all geared at advancing the industry and aiding national and regional development.

The Business of Science

Ms. Chenielle Delahaye-McKenzie

De La Enzie Essentials

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De La Enzie Essentials is an all-natural plant oil, natural products and nutraceuticals company, based on Burlington Avenue, Kingston 10 Jamaica. We make and sell authentic Jamaican essential oils, fixed oils, butters, body and hair natural products, soaps, candles, cosmetic and nutraceutical products as well as their accessories. Consultancy services are also offered to individuals and companies in product formulation and development.

De La Enzie Essentials officially started business in January 2015. De La Enzie Essentials is a continuation of a Ph.D. research on Jamaica's medicinal plant extracts and their biological activity, done by me, Chenielle Delahaye-McKenzie, Chief Executive Officer (CEO) and Research Scientist. I started my PhD research in September of 2007 on 20 different medicinal plants in Jamaica. After successful completion of Ph.D. bench work in 2014, I continued extracting. However, my focus shifted to producing essential oils for retail purposes, as a result De La Enzie Essentials was formed. My team now consist of four other individuals including sales representative, marketing and social media manager, a laboratory technician and a laboratory assistant. We also have a steady inflow of volunteers from University of Technology, Jamaica throughout the year.

We extract unique Jamaican plant oils and butters, we also incorporated these oils into soaps, candles and other cosmetic products. They are all 100 % pure and can be used for medicinal, therapeutic and aromatic purposes. Our oils are made from organic Jamaican grown plants and are in demand by chemists, cosmeceutical producers, business owners and health conscious individuals. We also provide workshops, which we use as a tool to help other entrepreneurs to master the science of making natural cosmetic and nutraceutical products. To date we have partnered with Social Development Commission (SDC) in five parishes (Montego Bay, Hanover, Trelawny, St Catherine and Clarendon) to conduct our natural products workshop with current and aspiring entrepreneurs. With over 20 participants going on to registering their businesses with the Companies Office of Jamaica and have progressed well on the local market.

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The Business of Science: Ms. Chenielle Delahaye-McKenzie

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De La Enzie Essentials is currently 100% funded by the CEO, but hopes to acquire investors in the near future. Today we operate from our own retail store, selected retail stores in Jamaica, our online store, Instagram and Facebook.

I enjoy my job tremendously; creating and using my skills as a scientist and artist to effect positive change and promote healthy living.

Our customers are our business! We appreciate large and small supporters and will go above and beyond to serve every customer's need. Only organic Jamaican plant materials are used for extractions; its high-quality products at its finest, and you get value for money. Products are developed and formulated from strong scientific research on each ingredient therapeutic property. Continuous product development and innovation of new products for and with customers in mind. De La Enzie Essentials continues to grow and expand our products along with our range of services. We pride ourselves in delivering fast, efficient products and services based on our key values.

Extending the Legacy

SCIENTIFIC TRAILBLAZERS

Scientific Trailblazers

Mr. Carl Christopher W. Beckford

Programme: Ph.D. in Computer Science
Field of Study: Software Engineering -Open Learning & Online Learning
Contact: carl.beckford@uwimona.edu.jm

Research Title:
Learner-Centric Course Delivery in the Online Environment

Research Activity

"What? Four final examinations in one week?" This was the cry of at least four Computing undergraduate students namely Daine Brissett, Kadira Carter, Christopher Jaggon, and Marlon O'Neil, who felt that students should not have to endure this, amidst an examination period that spanned at least fifteen days. They also reportedly knew of some other students whose timetable had clashes thereby having at least two course examinations scheduled for the same date and time. Searches for a web-based, open source, student-centric, student-teacher equitably beneficial, efficient or reasonably efficient examination scheduling system proved futile. After discussions we pledged to find a solution to the problem with me supervising their final-year group project. Thus began the project of the Ricoché course delivery scheduling system.

The Ricoché team examined the examination scheduling problem, various examination scheduling algorithms, and use these as the basis for purporting a student-centric, growth-oriented approach to the examination minimal spread and clashing problem. Ricoché was developed to provide for examination course spread, course concurrency and the generation of a usable clash matrix. The initial system provided an examination solution by using graph coloring with heuristics, as the basis for a solution towards optimality. Ricoché also served to provide equity among all parties and ease of expansion for growth with respect to new constraints or considerations for new examination schedules. The team of final year students published and presented their work Ricoche, A Student-Centric Growth-Oriented Examination Scheduling Algorithm at the 24th Annual AACE EdMedia World Conference on Educational Media & Technology, Denver, Colorado.

The problem of scheduling teaching and assessment activities is prevalent where an institution has course delivery with synchronous activities. Institutions may develop an acceptable solution over many attempts but are required to determine another workable solution in the event of new courses or new course group selections as per student registrations. Within the University of the West Indies, the process of comprehensive faculty course delivery scheduling was tedious, possibly error prone and resulted in departmental scheduling and student and/or room timetable clashing. The Ricoché team was invited by the Faculty of Science and Technology to expand the examination scheduling solution. New modules of Ricoché

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Scientific Trailblazers: Mr. Carl Beckford

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ensured that via a 3-dimensional day-time-room matrix, a course delivery (teaching and assessment) solution was provided towards ease of adaptability as curricula, teacher preferences and students' course needs change.

Ricoché currently provides a single repository for all courses within a faculty or the university to be setup thereby allowing a faculty or university view rather than a departmental view, generates a system-determined optimal learner-centric timetable that minimizes inter- and intra-departmental room and student clashes, and efficient room capacity usage, and provides the modification of any class venue or time with real-time notification of potential and severity of clashes. An instantiation of the Ricoché system achieved 23% decrease in student course clashes, 7% decrease in room allocation clashes and 26% improvement in course spread for assessment scheduling.

A campus instance of the system including all courses of faculties now provides facility usage/availability for the university even where the option for timetable optimality is not yet employed.

AWARDS, SCHOLARSHIPS AND ACHIEVEMENTS

- Expert Level instructor Top 10 percentile Global Award – CISCO
- Distinguished Teaching Awards - University of the West Indies
- 20-year Development Award - Glad Tidings Open Bible Church
- Valedictorian - Jamaica Open Bible Institute
- Employee of the Year - Sagicor Life (Corporate and Finance Services)
- IBM 25th Anniversary Bursary - University of the West Indies
- Dean's Honour Roll - University of the West Indies
- Nominee – D. Henderson Scholarship - University of the West Indies.

PUBLICATIONS

Carl Beckford, Ezra K. Mugisa (2017). Towards Optimality in Online Learning – The OLeCenT Approach. Advances in Science, Technology and Engineering Systems Journal, 2(3): 819-838.

Beckford, C. and E. Mugisa (2016). "OLeCenT, A Tool towards Improving Online Learner-Centric Course Delivery". In Proceedings of the Future Technologies Conference (pp. 385–394). 6–7 December 2016, San Francisco, USA. Institute of Electrical and Electronics Engineers (IEEE). doi: 10.1109/FTC.2016.7821638.

Beckford, C. and E. Mugisa (2016). "Ricoché – Providing Learner-Centric Scheduling in a Blended Learning Environment". In Proceedings of the International Conference of Education, Research and Innovation (pp. 1852-1862). 17–19 November 2016. Seville, Spain. International Academy of Technology, Education and Development (IATED). doi: 10.21125/iceri.2016.1414.

Beckford, Carl and Mugisa, Ezra (2014). Learning Management Systems – The Current Picture. In Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education (pp. 153-163). AACE (E-Learn 2014), New Orleans, USA, October 2014.

Beckford, Carl and Mugisa, Ezra (2014). Generating A Clash Free Teaching Timetable. In Proceedings of KES Conference on Smart Technology based Education and Training 2014: KES (STET 2014), Chania, Greece, June 2014.

Beckford, Carl; Mugisa, Ezra; Brissett, Daine; Carter, Kadira; Jaggon, Christopher and Oneil, Marlon (2012). Ricoché, A Student-Centric Growth-Oriented Examination Scheduling Algorithm. In Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications. AACE (EDMEDIA 2012), Denver, USA, June 2012.

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SCIENTIFIC TRAILBLAZERS: MR. CARL BECKFORD

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PUBLICATIONS *cont'd*

Beckford, Carl and Mugisa, Ezra (2011). Towards Achieving an Ideal Environment for Teaching Programming Online. Proceedings of the International Conference on e-Business, e-Organization, e-Management and E-Learning (IC4E 2011), Mumbai, India, January 2011.

Beckford, Carl and Mugisa, Ezra (2010). A Tool for Learner-Centric Course Delivery in e-Learning. In J. Sanchez & K. Zhang (Eds.), Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2010 (pp. 2475-2484). Chesapeake, VA: AACE (E-Learn 2010), Orlando, USA, October 2010.

Beckford, Carl and Mugisa, Ezra (2009). Towards Enhancement in Online Learning. Proceedings of the 1st Caribbean Conference on Information and Communications Technology (CCICT 2009), Pages 75-81, March 2009;

Mugisa, Ezra and Beckford, Carl (2008). Conversion and Delivery of Courses via A Course Management System. European Conference on E-Learning (ECEL '08), Agia Napa, Cyprus, November 2008.

Scientific Trailblazers

Mr. Kimani A. Kitson-Walters

Programme: Ph.D. in Marine Sciences
Field of study: Marine Population Genetics and its application to Fisheries Management
Contact: kimani.kitson-walters@cnsi.nl; kimash21@gmail.com

Research Title:
Assessing the Genetic Connectivity of the Queen conch, *Lobatus gigas* in Jamaica's Exclusive Economic Zone

Research Activity

The queen conch is a giant sea snail that is harvested primarily for international consumption, producing earnings of US$ 8 million per year between 1997-2000.

The status of the conch population within Jamaica's Exclusive Economic Zone (EEZ) is relatively unknown except for those on the commercially threatened Pedro Bank, Jamaica's primary fishing ground. Assessment of these populations are limited to abundance surveys which does not capture their ability to recover from intense fishing pressure.

This research has determined that overfishing has severely impacted the genetic connections among the populations in Jamaica's EEZ. Interrupting the natural recovery process responsible for population growth. The status of the population on the Pedro Bank, Jamaica's last abundant population, is still unclear. The results suggest that this geographically isolated population is also genetically isolated from Jamaica's other populations, with no direct indication of how it is replenished. If this question is left unanswered, the future of Jamaica's conch industry may be threatened. We pull on examples in Florida where mismanagement has led to the closure of their conch fishery after which populations have not recovered for over 30 years. As well as in Mexico where a moratorium is in effect due to population reduction as a result of significant fishing pressure.

The results of our research along with recommendations have been sent to the Fisheries Division of the Ministry of Industry, Commerce, Agriculture and Fisheries, as well as published in the peer-reviewed journals, Fisheries Research and Diversity & Distribution. The recommendations, if adopted, will aid in enhancing the sustainable use of this marine resource.

I am currently Data Monitoring Officer at the Caribbean Netherlands Science Institute, St. Eustatius, Caribbean Netherlands.

Grants

This research was funded by the UWI Mona's Research and Publications Grant and the Smithsonian/Link Fellowship. The latter involved a three-month fellowship in residence at the Smithsonian Marine Station in Fort Pierce, Florida where I was mentored by leading researchers in the field of queen conch genetics.

Scholarships

- Carreras Postgraduate Scholarship 2015
- UWI Postgraduate Scholarship 2012-2014

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Scientific Trailblazers: Mr. Kimani Kitson-Walters

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Presentations

1. *Using Genetics as a Fisheries Management Tool: Potential Applications to the queen conch in the Dutch Caribbean.* Presented at Sea & Learn 2017 organised by the Sea & Learn Foundation in Saba, Caribbean Netherlands on October 25, 2017.

2. *Assessing the Genetic Connectivity of Lobatus gigas (Queen conch) population in the Jamaican Fisheries.* Presented at the Caribbean Netherlands Science Institute's Science Café in St. Eustatius, Caribbean Netherlands on September 21, 2017.

Publications

Kitson-Walters, Kimani A., Adam S. Candy, Nathan K. Truelove, Marcia E. Roye, Mona K. Webber, Karl A. Aiken, and Stephen J. Box. "Fine-scale population structure of *Lobatus gigas* in Jamaica's exclusive economic zone considering hydrodynamic influences." *Fisheries Research* 199 (2018): 53-62.

Truelove, Nathan K., Stephen J. Box, Karl A. Aiken, Azra Blythe-Mallett, Erik M. Boman, Catherine J. Booker, Tamsen T. Byfield, Kimani A. Kitson-Walters et al. "Isolation by oceanic distance and spatial genetic structure in an overharvested international fishery." *Diversity and Distributions* 23, no. 11 (2017): 1292-1300.

Kitson-Walters, K., Roye, M.E., Mona K. Webber, M.K., (2015). Assessing the genetic connectivity of the queen conch, *Strombus gigas* in the Jamaican fishery. Proceedings of the Tenth Conference of the Faculty of Pure and Applied Sciences, University of the West Indies, Mona, Kingston, Jamaica. June 9-11.

Scientific Trailblazers

Ms. Shaneica Lester

Programme: Ph.D. in Geography
Field of study: Water Resources Management
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www.linkedin.com/in/shanecia-lester-2453b252

Research Title:
An Empirical Analysis of Urban Vulnerability and Household Water (In)security: An investigation of how observed and projected changes in the availability and accessibility of freshwater resources impact household water security in the Kingston Metropolitan Region

Research Activity

Research Focus: Urban Vulnerability, Water Security, Water Governance

My research interest is to enhance the adaptive capacity of vulnerable societies to global change, particularly developing nations and Caribbean Small Island Developing States (SIDS) through sustainable planning. My interest is also grounded in exploring new ways of improving integrated water resource management within urban centers in an effort to mitigate against the growing threat of water insecurity in the context of global climate change through effective preparation, response and recovery solutions at the household to the national level.

Water security is a critical development issue as it affects health, poverty, lives, and livelihoods. The inherent physical, social and economic construct of a Small Island Developing State (SIDS) presents a high level of vulnerability to the impact of climatic changes. Developing tools which are able to guide policy and practice is essential in maintaining a state of water security. This research seeks several ways to operationalize the broad concept of water security and narrow the discourse of the global water crisis to a local context. Water security in this research looks beyond the physical availability of the resource to a more human-centered approach, thus exploring water-related risk particularly within the Kingston Water Supply System.

Over the years, reduced yields have been abstracted from groundwater sources within the Kingston Basin due to the prevalence of pollution from "soak-away" pits and saline intrusion. With the inadequacies of the Kingston water supply system's physical infrastructure and little opportunities to develop additional ground and surface water sources within the Kingston basin, the city has been plagued with a myriad of water problems. Projections of increasing temperature, evapotranspiration and reduced precipitation simulated by climate responses modelled over Jamaica are expected to aggravate the issues of water accessibility and increase the vulnerability of urban communities to the impacts of climate variability and change.

This study explores an integrative approach to water security which holds the potential for better water management. The research proposes a framework for exploring and identifying the vulnerability of urban households and communities to the threats of water insecurity. It looks at

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Scientific Trailblazers: Ms. Sheneica Lester

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specifics ways of measuring water accessibility in order to identify households with comparatively limited access. An analysis of intra-urban disparities is carried out in an effort to identify indicators of water accessibility at the local level. This involves a comparative analysis of the August Town and Mona Heights Community. The research also employs a participatory approach in exploring the political dimensions of water security, with emphasis on the current water governance framework, the dimensions of vulnerability within the water sector as well as decision-making processes.

Research of this nature is expected to aid local authorities, non-governmental organizations and/ or donors in strictly selecting the most vulnerable areas and communities for water intervention or improvement projects geared towards better access while enhancing the performance of the water sector.

Other Research Project

Project Title: "Surviving the Drought: An irrigation Curriculum for Jamaica's Small-Scale Farmers"

Grant: 20, 000 euro

Principal Investigators & Project Directors: Shaneica Lester and Anne-Teresa Birthwright

Duration: From 2016 until (ongoing)

This grant was acquired through the Barilla Center for Food and Nutrition (BCFN) Foundation Young Earth Solution BCFNYES! Research Grant Competition, in which the project directors were named winners. The competition received one hundred applications from 40 different countries and in September 2016, this project was selected as a part of the top 10 ideas to be presented at the 7th International Food and Nutrition Forum on December 1, 2016. I travelled to Milan, Italy to represent the team and present the project to a group of expert judges. The project was selected as the winning idea based on its robustness, potential impact and its presentation.

The project was geared towards increasing the adaptive capacity of farmers in water stressed areas of Southern St. Elizabeth through an educational and experimental design. To date approximately 57 farmers of 3 communities have benefited from the project. Aspects of the project will also be replicated by the Rural Agricultural Development Authority (RADA), through an FAO funded initiative to construct open-field low cost rainwater harvesting structures which were introduced to farmers under this project. The project team now seeks co-financing to upscale this successful project in a second phase.

You may visit the project website at https://irrigationffs.wixsite.com/Jamaica.

Presentations

I have shared various facets of my research at conferences both locally and internationally:

1. "An Empirical Analysis of Urban Vulnerability and Water (In)Security in the Kingston Metropolitan Area". Postgraduate Wall of Excellence, Outstanding Research for New Scholars Exhibition. The UWI Mona Research Days. February 7-9, 2018. *(Poster)*

2. "Exploring Conflicting Components of Water Provision and Access in the City: A case study of a Low Income Community". Presented at Jamaican Geographical Society: Celebrating 50 years of Geography, University of the West Indies, Mona . June 27-Jul 1, 2016.

3. "The Right to Water: Raising the Voices of the Urban Poor". The UWI Mona Research Days. February 17-19, 2016. *(Poster)*

4. "Thirsty Communities - Reducing Urban Vulnerability and Improving Water Accessibility in Kingston Jamaica: The Water Accessibility Index". Presented at Central European University (CEU), Budapest, Hungary. July 6, 2015.

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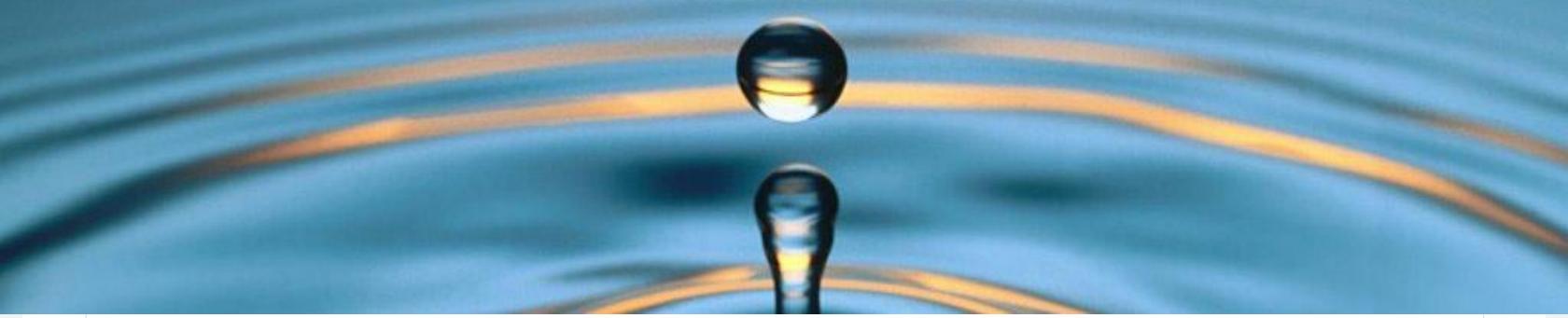

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PRESENTATIONS *cont'd*

5. "Forecasting by Analogy: Evaluating Resident's Response to the 2009-2010 ENSO Induced Drought to Anticipate Future Climate Impacts in Kingston". Presented at the 10th Faculty of Science and Technology Conference. June 8-11, 2015.
6. "*Exploring Residents' Ability and Willingness to Pay for Household Water Services in Kingston, Jamaica*" Presented at American Association of Geography Annual (AAG) Meeting, "Political Ecology, Water (In)Security and Natural Resources Management" session. Chicago, Illinois. April 21-25, 2015.
7. "*Improving Urban Water Accessibility in Kingston: A Case Study of the August Town Community.*" Presented at the 23rd Annual Caribbean Water and Waste Water Association Conference and Exhibition, "Water Waste and Energy in the Caribbean." Nassau, Bahamas. October 6-10, 2014.
8. "*Assessing the interplay between Water Accessibility and Urban Vulnerability: A Case Study of the August Town Community.*" Presented at the 6th British–Caribbean Geographers Conference, "The Caribbean Region: Adaptation & Resilience to Global Change." The University of the West Indies, Mona. June 23-27, 2014.

OTHER NOTEWORTHY PRESENTATIONS

- A roundtable discussion at the 8th International Forum on Food and Nutrition, Milan, Italy. December 4-5, 2017 entitled: "*Young Researchers seeking for Solutions*". The panel consisted of Anne-Teresa Birthwright, Elena Poverenov and Sam Loni.

- A public seminar held at the UWI Regional Headquarters, Ali Muhammed Meeting Room. October 27, 2017 entitled: "*Knowledge Transfer as an Adaptation Option to Climate Change*". The seminar provided a platform to share the success of the Surviving the Drought project, as well as to foster discussions between academics and key stakeholders within the agriculture sector.

SCHOLARSHIPS AND ACHIEVEMENTS

- The Prime Minister's Youth Award for Excellence for International Achievement, 2017.
- The University of the West Indies Postgraduate Scholarship, 2016.
- Outstanding Postgraduate Student, Faculty of Science and Technology Annual Award (2016).
- Summer University (SUN) Scholarship, Central European University (CEU), 2015.
- Outstanding Performance in Leadership: University of the West Indies, 2011.

PUBLICATIONS

Peer Reviewed Journal Articles

Lester, S. and Rhiney, Kevon. 2018. "Going Beyond Basic Access To Improved Water Sources: Towards Deriving A Water Accessibility Index". Habitat International 73: 129-140. doi:10.1016/j.habitatint.2018.02.001.

Note: This publication was recently featured in GWP-Caribbean news*: https://www.gwp.org/en/GWP-Caribbean/WE-ACT/news-page/News-and-Activities/2017-news-article/new-wai-paper/*

Lester, S. 2015. "Assessing Urban Household Vulnerability at the Climate-Water-Health Nexus in Kingston, Jamaica: a case study of the August Town Community". Caribbean Geography 20: 74-90.

Article

Birthwright, A. and Lester, S. 2017. An Irrigation Curriculum for Jamaica's Small-Scale Farmers. The UN Solution Sustainable Development Network, Youth. November 14, 2017. http://sdsnyouth.org/food-and-youth-stories/2017/11/14/surviving-the-drought-an-irrigation-curriculum-for-jamaicas-small-scale-farmers

SCIENTIFIC TRAILBLAZERS

Dr. Denneko Luke

Programme: Ph.D. in Botany
Field of study: Forest Ecology
Contact: denneko@gmail.com

Research Title:
Assessing the Effects of Hurricanes on Forest Dynamics, Structure and Diversity in a Lower Montane Wet Forest in John Crow Mountains, Jamaica

Ecological perspectives are increasingly becoming a part of the developmental plans of Governments as the effects of Global Climate Change (GCC) become more evident. As such, understanding the dynamics of the natural environment and the impact of GCC on these environments has become paramount. Within the Caribbean region, the anticipated increase in the frequency of high intensity hurricanes as a result of GCC is of particular importance. These storms have the potential to dramatically reshape the physical landscape, affecting ecosystems such as forests and severely impacting the services they provide. Forests are of increasing economic importance as governments of developing countries place emphasis on monetizing forest ecosystem services, which target carbon sequestration through programmes such as the United Nations Reducing Emissions from Deforestation and Forest Degradation Programme (UN-REDD). Additionally, our forests are vast reservoirs of biodiversity and are critically important in everyday life through maintaining water and carbon cycles, improving water and air quality as well as offering protection from flooding and landslides. As such, it is important to provide a foundation for exploration of the economic value of forest ecosystem services by understanding how disturbance events such as hurricanes can affect our forests.

My research aimed to increase our understanding of the impact of hurricanes on tropical forests. In particular, to examine the effects of intermediate intensity hurricanes on the dynamics, structure and diversity of the wet forest of the John Crow Mountains (JCM). The forest was impacted by Hurricane Dean (category 4) in 2007. It was therefore possible to assess how Hurricane Dean (and previous hurricanes) impacted different life stages of forest tree species (seedlings and mature trees) and other plant physiognomic groups (lianas, tree ferns, palms) over a 6 year period, between 2006 and 2012. I was able to ascertain the effects of previous hurricanes, namely Hurricane Ivan (in 2004) and Hurricane Dennis (in 2005), on forest trees, by employing a method (which was developed during the study by my PhD supervisor, Dr. KP McLaren, Dept. of Life Sciences, The UWI Mona) that can be used to model the effects of hurricanes (Exposure Vulnerability) at a more localized level and across the landscape. Seedling ecophysiology, specifically, the photosynthetic traits of several species, was also assessed and used to determine the possible mechanisms that governed species responses.

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Scientific Trailblazers: Dr. Denneko Luke

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The study revealed that one of the main effects of the hurricane was that it altered the relative importance of interactions between abiotic (light) and biotic (seedling density) factors, and seedling dynamics. Some interactions were not significant immediately after the hurricane, but were significant before or significant two years after the hurricane. The significance of the interactions varied among the years and among the species. The post hurricane response of the species was not linked to their ecophysiological characteristics (i.e. leaf-level photosynthetic traits were not good predictors of species response). Structural characteristics (basal area, volume, height, density) of the JCM wet forest were strongly influenced by topographic features such as aspect (the compass direction a slope faces) and these differences were enhanced by hurricane exposure. Tree densities, tree mortality and light levels at the forest floor were highest in areas with higher hurricane exposure. Similarly, post hurricane species diversity was higher at sites that were exposed to repeated hurricanes. Lianas and trees with larger stem sizes were better able to withstand the hurricane effects (i.e. more resistant) than those of smaller stature. The other physiognomic plant groups showed no significant changes in densities in response to the hurricanes.

Importance of Study

The study's findings lent support to the Intermediate Disturbance Hypothesis (IDH), which is one of several hypotheses that have been proffered to explain why tropical forests are so diverse. The IDH proposes that species diversity will be highest at sites that experience either intermediate levels of disturbance intensity or frequency. My study showed that there was greater species diversity at sites with exposure to all three hurricanes. Despite a general decline in forest structural characteristics (basal area, volume, density), several species benefitted from the disturbance created at sites that experienced repeated hurricane exposure. Thus, the hurricanes that impacted the site repeatedly over a period of three years may have increased and maintained environmental heterogeneity and this facilitated greater species coexistence. However, not all species benefitted: ecologically important species like *Hernandia catalpifolia* were negatively impacted by repeated hurricanes. *Hernandia catalpifolia* plays a critical role in life cycle of the Giant Swallowtail Butterfly (the largest butterfly in the western hemisphere) and changes in its dynamics may have 'knock-on' effects on the Giant Swallowtail Butterfly population.

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Scientific Trailblazers: Dr. Denneko Luke

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Research Higlights

My research highlighted that an expected increase in the frequency of high intensity hurricanes will have both positive and negative effects on montane forests in Jamaica. In addition, the results of this study will help to inform strategies at the national level for increasing ecosystem resilience. Several native species should be prioritized for reforestation programmes to increase climate change resilience due to their ecophysiological traits and their resistance and resilience to hurricane effects. Moreover, this research provides a foundation for the exploration of the economic value of our forests within the context of the UN-REDD+ programme.

I have (thus far) published 4 peer reviewed journal articles from my research and given presentations at the 21st Anniversary Conference of the Blue and John Crow Mountains National Park in February 2014 and at a Jamaica Conservation and Development Trust Forest Ranger Training seminar in October 2014. My research was featured in the UWI Mona Research for Development 2018 Magazine, along with a poster at the UWI Mona Research Days 2018 Post Graduate Wall of Excellence. I continue to have a strong interest in forest ecology and climate change effects, along with interests in remote sensing and predictive modeling.

Publications

1. Luke, Denneko Y., and Kurt McLaren. 2018. "Are species photosynthetic characteristics good predictors of seedling post-hurricane demographic patterns and species spatiotemporal distribution in a hurricane impacted wet montane forest?" *Acta Oecologia* (forthcoming)
2. Luke, Denneko Y., Kurt McLaren, and Byron Wilson. 2016. "Modelling Hurricane Exposure in a Caribbean Lower Montane Tropical Wet Forest: The Effects of Frequent, Intermediate Disturbances and Topography on Forest Structural Dynamics and Composition." *Ecosystems* 19(7): 1178-1195. doi:10. 1007/s10021-016-9993-y
3. Luke, Denneko Y., Kurt McLaren, and Byron Wilson. 2016. "Short-Term Dynamics and the Effects of Biotic and Abiotic Factors on Plant Physiognomic Groups in a Hurricane-Impacted Lower Montane Tropical Forest." *Biotropica.* 48(3): 332–341. doi:10.1111/btp.12288.
4. Luke, Denneko Y., Kurt McLaren, and Byron Wilson. 2014. "The Effects of a Hurricane on Seedling Dynamics and Abiotic Interactions in a Tropical Lower Montane Wet Forest." *Journal of Tropical Ecology* 30: 55–66.

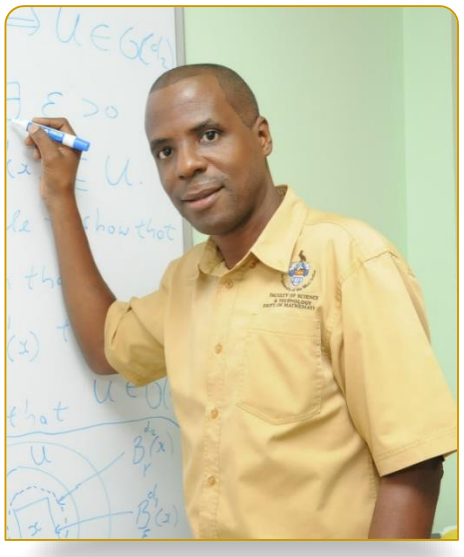
Grants

My research was supported by several grants (secured by Dr Kurt McLaren and Professor Byron Wilson). These grants were obtained from the Rufford Foundation, the International Foundation for Science, the Wildlife Conservation Society and The Environmental Foundation of Jamaica and were used to cover the cost of plot establishment and the 2006 assessments. The Jamaica Protected Area Trust (Forest Conservation Fund) provided financial assistance for the 2012 assessments.

Scientific Trailblazers

Dr. Kirk Morgan

Programme: Ph.D. in Mathematics
Field of study : Mathematics
Contact: kirk.morgan02@uwimona.edu.jm



Research Title:
The Dirac equation in the Kerr-de Sitter metric (General Relativity)

Research Activity

We consider a Fermion in the presence of non-rotating black hole, immersed in a universe with a positive cosmological constant. After presenting classification of the number and types of the horizons, we adopt the Carter tetrad to separate the Dirac equation into an angular and radial equation. We show how the Chandrasekhar ansatz leads to the construction of a symmetry operator which can be interpreted as the square root of the squared total angular momentum operator. Also, we show that there exist no bound states for the Dirac equation in the non-extreme case.

The research I did is important and has long term implications because just as how all stars were born and then eventually die, so will our "sun" one day since it is also a star.

Presentations

I presented at conferences held as follows:

1. November 17 to 21, 2015, at the Universidad de los Andes, Bogota, Colombia.
2. July 12 – 18, 2015, at the University of Sapienza, Rome, Italy.
3. March 2 – 7, 2008 in Colombia at the Royale Caribe.

Awards, Scholarships and Achievements

Faculty of Science and Technology award for Outstanding Achievement in Teaching Assessment for 2012/2013.

Faculty of Pure and Applied Sciences award for Outstanding Achievement in Teaching Assessment for 2009/2010.

From 2005 – 2007, I was granted a departmental award from the Department of Graduate Studies and Research, to pursue a MPhil at the University of the West Indies, Mona, Jamaica.

In 1998 I was granted a Scholarship from the National Housing Trust, for outstanding work performance, to pursue a BSc degree at the University of the West Indies, Mona, Jamaica.

In 1990 I was granted a Scholarship from the USAID, for outstanding academic performance, to pursue an Associate degree at the University of Wisconsin, Marinette, USA.

In 1988 I was granted the Edmond Bartlett Scholarship, for outstanding academic performance to attend the Kingston Technical High School.

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Scientific Trailblazers: Dr. Kirk Morgan

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PUBLICATIONS

Batic, Davide, Morgan, Kirk, Nowakowski, Marek and Medina, S. Bravo. 2018. "The Dirac equation in the Kerr-de Sitter metric". Classical and Quantum Gravity. (accepted and due for publication in June 2018)

Batic, Davide, Nowakowski, Marek and Morgan, Kirk. 2016. "The problem of embedded eigenvalues for the Dirac equation in the Schwarzschild Black Hole metric". Universe 2(4): 1-14. 2016.

Kelly, Conall and Morgan, Kirk.2008. "A Monte-Carlo approach to the effect of noise on local stability in Polynomial Difference Equations". Matematicas: Ensenanza Universitaria XVI(2): 1-8.

Scientific Trailblazers

Dr. Peter Nelson

Programme: Ph.D. in Chemistry
Field of study: Materials Chemistry and Thermodynamics
Contact: peter.nelson02@uwimona.edu.jm
https://scholar.google.com/citations?hl=en&user=2J1dnFwAAAAJ

Research Activity/Interest

For the continued advancement of technology and hence, human civilization, the call for new bio-friendly materials, offering tuneable properties in conjunction with smartness; must be answered. Hence, research in my group is focused on the development of smart materials for the transport, release and or detection of solutes (ions and small molecules) in reaction to various stimuli. Our work can be classified under three main areas of physical chemistry:

Liquid Crystals have been around for over a century, however, their application beyond liquid crystal display devices is sparse. Hence, one aspect of our research is aimed at the development of biologically friendly **Stimuli Modulated Phase Switchable Liquid Crystal Oligomers** (marco-molecules); capable of switching between micro-molecule coordinating and non-coordinating phases. Such molecules will be able to exist in biological systems where they can remain dormant, reacting only to specified changes in their environment by releasing small molecules (drug molecules). The development of these compounds will not only allow single-step administration of multi-dosage drugs but will also allow site-specific delivery of such chemicals; toxic to both health and diseased tissue.

The importance of **Metal absorbing/ transport systems**, capable of removing highly toxic ionic species from water cannot be over emphasized; the same can also be said of the detection of such species. Therefore, part of our work is focused on the development of cheap polymeric ion absorbing materials, based on polymeric crown ethers, capable of being controlled (switched on and off) by changes in their environment. Such materials could also find application as smart blood electrolyte (Ca^{2+}, Na^{+}, K^{+}) regulators; gated by electrolyte concentration. The regulation of blood glucose levels could also become a target for these systems; already under development in our lab.

Quantum Mechanical Modelling of chemical systems to predict both their physical and chemical states as it relates to their energies, has matured significantly since its conception. The use of these theories offers a tool box of considerable diversity, allowing the theoretical designing and testing of chemical systems prior to synthesis. Therefore, as my group seeks to prepare advanced materials for various applications, we are actively indulged in the modelling of our compounds as a guiding light for their synthesis and testing.

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Scientific Trailblazers: Dr. Peter Nelson

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Presentations

1. *Surface Patterning of n-octadecyltrichlorosilane (OTS) Self Assembly Monolayers: Constructive Nanolithgraphy.* International Nanotechnology Conference & Expo April 4 – 6, 2016, Baltimore, USA.

2. *Physico-chemical and biological properties of polypyridyl hydrazonic ligands.*Faculty of Science and Technology, UWI-Mona conference, 2015.

3. *Room temperature molecular and lattice structures for a homologous series of anhydrous sodium(I) n-alkanoates.* 244th ACS National Meeting and Exposition (Theme – Materials for Health and Medicine), Philadelphia, PA, August 19 - 23, 2012.

4. *A molecular model for the odd-even alternation in a homologous series of anhydrous silver(I) n-alkanoates.*7th National Symposium and Conference on Solid State Chemistry & Allied Areas (ISCAS -2011). Jamia Millia Islamia, New Delhi, India, November 24 - 26, 2011.

5. *A molecular model for the odd-even behavior in zinc(II) carboxylates.* 5th IUPAC- Sponsored International Symposium on Macro and Supramolecular Architectures and Materials, Sunset Jamaica Grande Resort and Spa, Ochi Rios, Jamaica, August 15 – 20, 2010.

Grants

- 2017 Principal's New Initiative Grant Awardee. Value: 1.5 Million JMD
- 2017 Gary and Pennie Abramson Foundation Grant. Value: 1.9 Million JMD
- 2017 Jamaica-South Africa Joint Science and Technology Cooperation Grant.
  Value: 7.5 million JMD (+ additional 2 million JMD)

Scholarships and Achievements

- Principal's Research Days 2017 Award for Best Research Publication (Article).

Publications

Articles

Odd-even Alternation in a Homologous series of Zinc(II) *n*-alkanoates. P. N. Nelson, H. A. Ellis and R. A. Taylor. *J. Mol. Struct*. 2011, *986*, 10-15.

Thermal and Odd-Even behaviour in a Homologous series of Lithium(I) *n*-alkanoates. N. A. S. White, H. A. Ellis and P. N. Nelson, P.T. Maragh. *J. Chem. Thermodynamics* 2011, *43*, 584-590.

Structural, Odd-Even chain Alternation and Thermal investigation of a Homologous series of Anhydrous Silver(I) *n*-Alkanoates. Peter Nattaniel Nelson and Henry Anthony Ellis. *Dalton Trans*. 2012, *41*, 2632-2638.

The effects of Molecular and Lattice Structures on the Thermotropic Phase behaviour of Zinc(II) Undecanoate and Isomeric zinc(II) Undecynoates. Peter N. Nelson, Richard A. Taylor and Henry A. Ellis. *J. Mol. Struct*. 2012, *1034,* 75-83.

Effects of Molecular and Lattice Structure on the Thermal Behaviors of some Long Chain Length Potassium(I) *n*-Alkanoates. Peter N. Nelson, Henry A. Ellis, Richard A. Taylor. *J. Mol. Struct*. 2014, *1058*, 234 – 243.

Theories and Experimental Investigations of the Structural and Mesomorphic Phase Behaviours of Metal Carboxylates. Peter N. Nelson, Richard A. Taylor, *Appl. Petrochem. Res.* 2014, *4*, 253–285. doi:10.1007/s13203-014-0044-3.

Reply to comments on the Inter-planar Structures and Lamellar Packing of Short and Long chain Zinc (II) *n*-Alkanoates. Peter N. Nelson, Henry A. Ellis, Richard A. Taylor. *J. Mol. Struct*. 2014, 1070, 106 – 109.

Odd-even Chain Packing, Molecular and Thermal Models for some Long Chain Sodium(I) *n*-alkanoates. Peter N. Nelson, Henry A. Ellis, *J. Mol. Struct*. 2014, 1075, 299 – 310. DOI:10.1016/j.molstruc.2014.05.069.

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Scientific Trailblazers: Dr. Peter Nelson

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Articles cont'd

Powder X-ray Diffraction, Infrared and ^{13}C-NMR Spectroscopic Studies of the Homologous Series of some Solid-state Zinc(II) and Sodium(I) *n*-alkanoates. Peter N. Nelson, Richard A. Taylor, *Spectrochimica Acta Part A*. 2015, 138, 800 – 806.doi:10.1016/j.saa.2014.11.010

Solid State ^{13}C-NMR, Infrared, X-ray Powder Diffraction and Differential Thermal Studies of the Homologous Series of some Mono-valent Metal (Li, Na, K, Ag) *n*-alkanoates: A comparative study. Peter N. Nelson, Henry A. Ellis, Nicole A. S. White, *Spectrochimica Acta Part A*, 145 (2015) 440 – 453. doi: 10.1016/j.saa.2015.02.101

Temperature and Chain Length Dependence of the Vibrational Spectra of some Anhydrous Silver(I) *n*-Alkanoates. Peter N. Nelson, *International Journal of Spectroscopy*, 2016, 1 – 10. doi: 10.1155/2016/3068430

Spectroscopic, X-ray crystallographic and electrochemical properties of di-2-thienyl ketone·di-2-thienyl ketone thiosemicarbazone hybrid [dtk.dtktsc] and [dsktsc]. Mohammed Bakir, Mark Lawrence, Peter Nelson, *Electrochemica Acta*., 2016, 212, 1010 – 1020.

A Comparative Discussion of the Mesomophic and Crystal-Crystal Phase Transition Behaviours of the Homologous Series of some Solid State Anhydrous Zinc(II) and Sodium(I) *n*-Alkanoates. Peter N. Nelson, Richard A. Taylor, *Thermo Chimica Acta* (submitted).

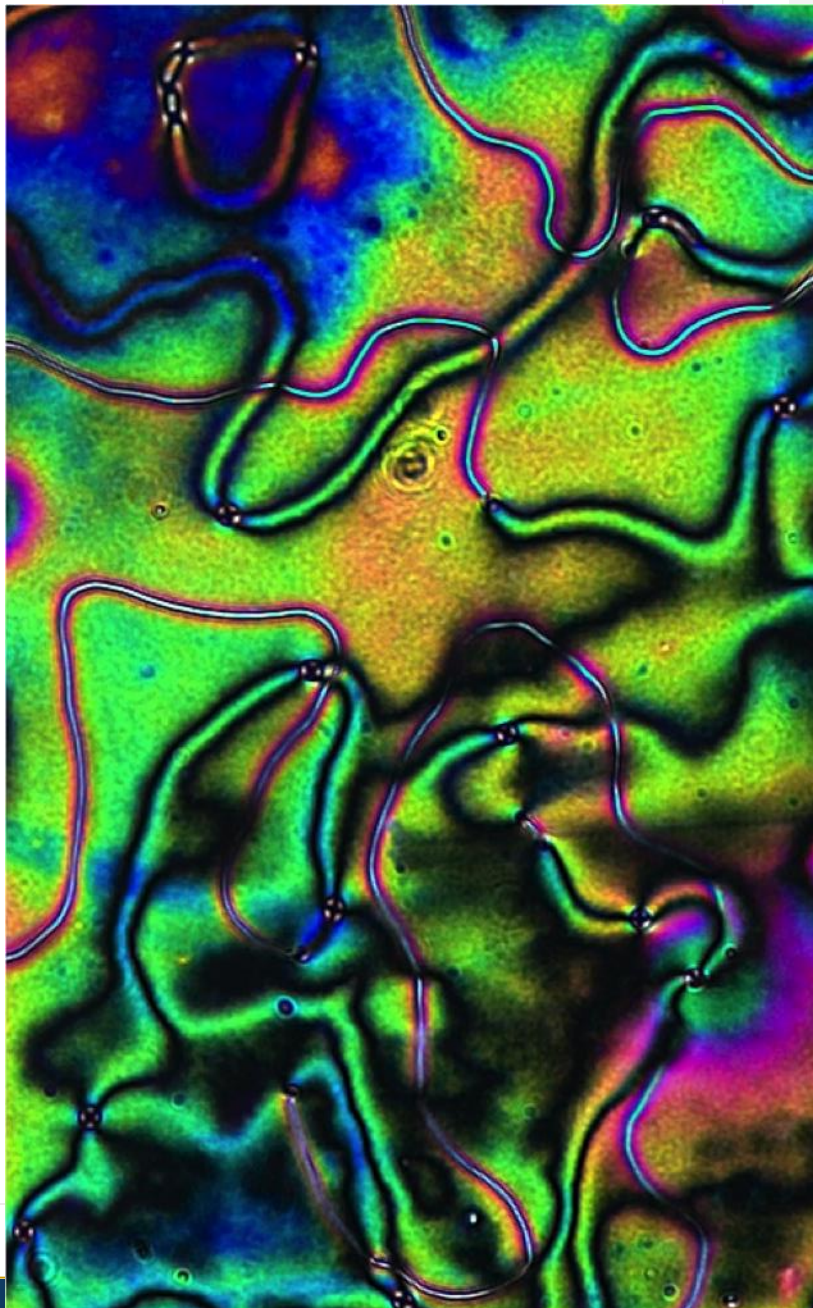
Site-Targeted Interfacial Solid-Phase Chemistry. Rivka Maoz, Doron Burshtain, Hagai Cohen, Peter Nelson, Jonathan Berson, Alexander Yoffe, and Jacob Sagiv, *Angewandte Chemie*, 2016, 128(40), 12554 – 12559.

Review: Pincer ligands—tunable, versatile and applicable. Mark A.W. Lawrence, Kerry-Ann Green, Peter N. Nelson, Shannen C. Lorraine. *Polyhedron,* 2017. doi:10.1016/j.poly.2017.08.017

Books

Structure and Thermal Behaviours of Ag(I), Na(I) and K(I) *n*-Alkanoates. Peter N. Nelson. Lambert Academic Publishing, Editors: L. Thompson and Henry A. Ellis, 2014. ISBN: 978-3-659-51412-8.

Structure and Phase properties of some Monovalent Metal *n*-Alkanoates. Peter N. Nelson. Lambert Academic Publishing, Editor: Iuliana Oaserele, 2015, ISBN: 978-3-659-71135-0



Expanding the Legacy

LOOKING TO THE FUTURE

THE

BIOTECHNOLOGY CENTRE

Biotechnology Centre

Julian Bailey

Programme: MPhil in Biotechnology
Field of Study: Medicinal Biotechnology
Supervisor(s): Prof. Patience Bazuaye-Alonge
Co-Supervisor: Prof. Helen Asemota

Cancer is the second leading cause of death in the Americas, killing 1.3 million annually, with 50 percent of cancer-related deaths in the Caribbean and Latin America (PAHO, 2007). It is expected that by 2030, 1.7 million cases of cancer will be diagnosed in the Caribbean and Latin America and over a million will die each year from the disease.

There has always been concern about the possible impact that being exposed to the environment surrounding the mining of bauxite could have on the health of individuals. Persons have complained of respiratory diseases such as asthma that some believe developed because of exposure to the mining of bauxite while others have said the environment has been known to exacerbate the symptoms. There could be other environmental/dietary factors that may predispose the individuals.

The presence or absence of trace elements and heavy metals in human tissues has been implicated in both the development and the progression of some types of cancers. Thus, the levels of these elements in the human body has gained a lot of scientific attention in recent years. While these elements are important components of certain biological structures as well as some physiological processes, they may also pose a threat if their levels in the body rise beyond what is necessary for their physiological functions (Emre et al., 2013; Gecit et al., 2011; Cavusoglu et al., 2008).

The point of diagnosis of these diseases are rarely ever examined, therefore there is not much literature on it. Also, most individuals rarely visit the doctor until they are symptomatic. Information taken at the point of diagnosis can help with the treatment of prognosis of these diseases. Research on the point of diagnosis will take a molecular approach. My research entitled "The Role and Effect of Environmental Chemical Exposure to the Development of Cervical-Prostate-Colon (CPC) Cancers in Middlesex" will incorporate clinical investigations as well as microbiological investigations.

Princess Bell

Programme: MPhil in Biotechnology
Field of Study: Medicinal Biotechnology
Supervisors: Prof. Helen Asemota ; Prof. Denise Eldemire-Shearer
Advisors: Dr. Winston De La Haye ; Prof. Wayne McLaughlin

Marijuana, has long been known as a potent medicinal plant for over 5000 years. However, the plant is still being heavily researched, with special emphasis being placed on the non-psychoactive component, cannabinoids, that the plant possesses.

The anti-hypercholesterolemic properties of Jamaican *Cannabis* varieties will be investigated in a study entitled "Investigations into the anti-hypercholesterolemic and anti-hyperlipidemic properties of innovative products from the bio-materials of Jamaican Cannabis Varieties".

Samples of the plant materials are collected from the Faculty of Medical Sciences Cannabis Research Group and dried in line with standard procedures. The polar extract of the plant material was concentrated. After ethical approval is received, Sprague-Dawley rats will be grouped and used for rat models of hypercholesterolemia (induced under laboratory conditions). The concentrated extract will be mixed with rat food and fed to hypercholesterolemia induced rats according to the feeding regime assigned to the different groups.

The diets to be assigned include but, are not limited to: normal rats (negative control) to be fed normal diets plus the extract and diet-induced hypercholesterolemic rats (positive control) to be fed the extract plus a known anti-hypercholesterolemic drugs on the market.

It is expected that the administration of the extract will result in a decrease in the serum cholesterol levels. Further analyses of various varieties with cholesterol lowering principles will be done to identify varieties that could be used as possible sources of anti-hypercholesterolemic and anti-lipidemic pre-drugs.

Biotechnology Centre

Orville Byfield

Programme: MPhil in Biotechnology
Field of Study: Sports Biomedicine
Supervisor: Dr. Racheal Irving
Co-Supervisor: Prof. Helen Asemota

The title of my thesis is "Investigations of Yam (*Dioscorea cayenensis*) Consumption in Jamaican Adolescent Sprinters for Sports Biomedical Purposes". The aim of this study is to investigate muscle mass development in adolescent sprinters who consume *Dioscorea cayenesis* at least four times per week in diet and to ascertain if there is an association between yam consumption and sprinting prowess in Jamaicans. Correlations among the different varieties of yams will be determined so as to ascertain the biochemical parameters of muscle mass development. Verification will be done by ultrasonography.

The results of this study will create awareness of the factors which might affect muscle development of adolescent sprinters who compete in track events. I have been strongly affiliated with Sports for the past 18 years during which I have obtained an IAAF Level 5 Track and Field Coaching Diploma in California and have competed and held administrative positions at various levels and in a number of institutions. I completed a Master's Degree in Physical Education and Sports in Cuba where I garnered lifelong experiences with national elite coaches and teams. I am a lecturer at the University of Technology, Jamaica, and was the head of the Caribbean School of Sport Sciences in the Faculty of Science and Sport for the past five years.

In 2011, I was awarded a contract by the Ministry of Youth, Sport and Culture to carry out a pre-feasibility study in the area of sports development, the findings of which would be included in the justification for building an International Elite Sport Training Facility in Jamaica on behalf of UNESCO.

I have held many managerial positions including Head Coach and Physical Education teacher at Kingston College (KC), and owner/manager of Pro Launch Track Club Jamaica. I was a National Coach for Jamaica and sat in the capacity of Head or Assistant Coach for various international competitions including the Youth Olympics (China, 2014), the Central America and Caribbean Games, and the Pan-American Games.

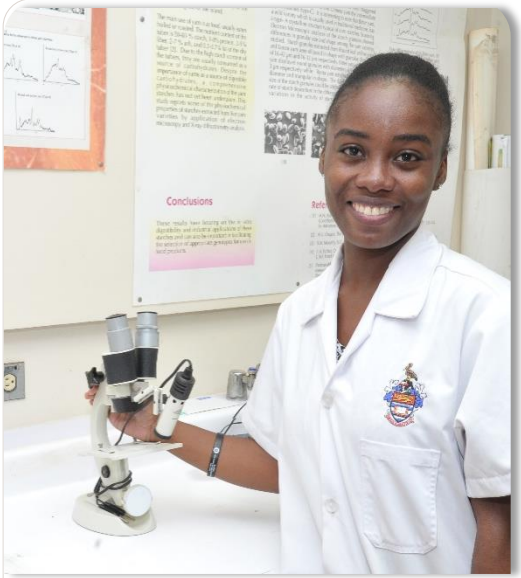
Antoni Comrie

Programme: MPhil in Biotechnology
Field of Study: Medicinal Biotechnology
Supervisor: Dr. Mohammad K. Ali (Dept. of Biochemistry)
Co-Supervisor: Prof. Helen Asemota (Biotechnology Centre)

From the inception of medicine in human societies, there has been the use of herbal remedies, plants and various preparations of plants to treat, manage or cure human illnesses. These plants are not only a fundamental part of the history of human medicine but approximately 25% of therapeutic medicines find their origins in plants, and 50% are synthetic medicines obtained from compounds isolated from medicinal plants. This is supported by the estimated US $14 billion dollar market for the trade of herbs and medicinal plants.

This project addresses the problems of a lack of knowledge of the variety of endemic medicinal plants in Jamaica. We want all of the indigenous plants and the related biodiversity they entail to be well catalogued, studied, protected and sustainably harnessed to produce products and services for the development of the country. My research could elucidate a number of medicinally relevant compounds with endemic plant origins, namely from the Smilax genus which is the focus of my study. The genetic identification of such plants, followed by the targeted isolation of useful compounds, may unlock a wealth of research possibilities, new compounds for application in industry, along with the ability to produce antifungals, antimicrobials, commercially relevant products and medicines for local use and export by the use of local plants controlled by a local market. To this end I have obtained 7 Smilax samples from 3 parishes across the island and have begun to develop tissue culture protocols to mass produce the aforementioned plants. Additionally, I have begun to extract and store DNA samples from each variety for genetic level identification. Extracts will be obtained from each of the samples in turn and screened against common Gram positive and Gram negative bacteria.

Biotechnology Centre



Donella Dawkins

Programme: MPhil in Biotechnology
Field of Study: Medicinal Biotechnology
Supervisor: Prof. Monica P. Smikle
Co-Supervisors: Dr. Camille-Ann Thoms-Rodriguez; Dr. Orville D. Heslop

Having completed my Bachelor's degree in Microbiology, I am currently pursing my Master of Philosophy degree in Biotechnology. My research will focus on "Exploiting Toxin Antitoxin (TA) Systems as Potential Antimicrobial Target in Vancomycin Resistant Enterococci (VRE) in Jamaica".

Enterococci are natural inhabitants of the human gastrointestinal tract. Though benign, since the last few decades, they have been implicated in major infections and increase mortality. This is mainly due to the emergence of acquired antibiotic resistance in the mid-1980s. Vancomycin-resistant enterococci (VRE) are important hospital pathogens that are resistant to most major classes of antibiotics. The incidence of VRE is increasing and has been reported and confirmed here in Jamaica. The exact mechanism by which VRE maintains its plasmid-encoded resistance genes is ill-defined, and novel targets for the treatment of VRE are lacking. The TA system is a regulatory system where two sets of genes encode a toxin and its corresponding antitoxin. The antitoxin binds to and sequesters the toxin. However, if a plasmid-free daughter cell arises, the unstable antitoxin is degraded. The effect of this toxin can either be bactericidal or bacteriostatic depending on their specific target in the cell. Samples will be collected from hospitals across Jamaica to probe for the presence of TA gene systems. Series of microbiological, biochemical and molecular testing and biotechniques will be carried out to successfully identify the strains. The prevalence of TA systems and identity of the vancomycin resistant gene will be identified that may link TA systems to maintenance of multi-drug resistant genes. Therefore, an attractive strategy for tailored antimicrobial therapy for Enterococci infections will be to find a TA system that is ubiquitous, potent and is a sensitive target in all strains. This strategy will be helpful in combatting antimicrobial resistance that complicates treatment options.

Shivanjali Dondapati

Programme: MPhil in Biotechnology
Field of Study: Agricultural Biotechnology
Supervisors: Prof. Helen Asemota ; Prof. Helen Jacobs

Yams are major agricultural commodities and important staple foods for millions of people in the tropics and subtropical Africa, central and South America, parts of Asia, the Caribbean including Jamaica and Pacific Islands. Yam production is considered as a source of food security in many areas where it is cultivated. Pests and pathogens are major threats to yam production. The main pathogen is *Colletotrichum gloeosporoides,* which causes yam anthracnose disease. My research focus is to combat the Yam anthracnose disease in Jamaica. This disease causes yield losses as much as 90% in susceptible genotypes. *Dioscorea alata* is the most popular species in the Caribbean, and it is the most susceptible to anthracnose than other species. It is feared that with this disease, Sweet Yam which has reduced drastically may go into extinction in Jamaica. Anthracnose disease can be controlled by chemical fungicides, but the frequent fungicide application may lead to environmental damage and fungicide resistance. Another alternative method is host plant resistance to anthracnose disease. However it has been shown that the organism has high genotypic diversity and a potential to develop new virulent strains that can break existing resistance. Novel tools are needed for rapid diagnosis. It can be achieved by biosensors. These biosensors provide analytical information using biological recognition elements such as antibodies and enzymes. My aim is to produce antibodies against Yam anthracnose organism using chickens to detect the disease in early stage. This early diagnosis serve farmers to identify healthy yam plantlets for farming which would help to combat the disease.

Biotechnology Centre

Kimberley Foster

Programme: MPhil in Biotechnology
Field of Study: Medical Biotechnology
Supervisor: Dr. Rupika Delgoda
Co-supervisor: Prof. Helen Asemota

I am a graduate scholar currently pursuing my studies in the department of Biotechnology in conjunction with the Natural Products Institute. My research "Assessing the use and bioactivity value of local medicinal plants in Cancer treatment" is aimed at understanding the role of medicinal plants currently in use by cancer patients in Jamaica. It involves exploring the reliance on medicinal plant therapy among cancer patients in Jamaica by conducting a quantitative survey at outpatient clinics at the University Hospital of the West Indies and screening selected plants for their potential to impact the growth of cancer cells.

My work is mainly conducted in the Cytotoxicity Screening Lab at The Natural Products Institute where mammalian cells including human colon, breast and prostate cancer cells are cultured. An assay for assessing cell cytotoxicity is used to identify various plant extracts that have potent and selective impact on these cancer cells. In addition, the impact on human cytochrome P450 enzymes will also be assessed to evaluate potential for inhibiting carcinogenesis and potential drug-herb interactions.

Since Jamaicans are known for their high use of medicinal plants, it is important to assess the safety and efficacy of such practices for a public health benefit. This project will allow assessment of the value of Jamaican biodiversity in treating and preventing the most prevalent types of cancers affecting people in Jamaica and around the world.

This research has received funding from the University of the West Indies Research and Publication Fund and Graduate Awards and the National Health Fund, Jamaica.

So far my work has been presented at numerous conferences including the Medical Sciences Annual Research Conference (2016); The Society for Scientific Advancement Conference (2016) and the African Caribbean Cancer Consortium Scientific and Training Conference in Miami, Fl. (2017).

Tamara Grant

Programme: MPhil in Biotechnology
Field of Study: Agricultural Biotechnology
Supervisors: Dr. Cliff Riley ; Prof. Helen Asemota

I am engaged in research that is a crop protection initiative against the devastating impact of the yam anthracnose disease on Sweet yam (*Dioscorea alata*) production in Jamaica. The incidence of this disease is reported to be the result of infection by the virulent fungus *Colletotrichum gloeosporioides* that is recognized as one of the most significant plant pathogens worldwide.

Local production estimates for Sweet yam (*D. alata*) declined from 6,313 tonnes in 2005 to 1,768 tonnes in 2014. Over the same period Yellow yam (*D. cayenensis*) that has displayed high tolerance to the disease estimated production level increased from 66, 243 to 95,654 tonnes. This is indicative of the yam anthracnose disease reaching epidemic proportions in Jamaica.

The principal objectives of my project "Molecular Analysis of *Colletotrichum gloeosporioides,* the Anthracnose Causative Fungus, from Yams (*Dioscorea* spp.) Cultivated in Jamaica" are to determine the genetic, pathological and morphological diversity of *C. gloeosporioides* causing the yam anthracnose disease in Jamaica. It is important to characterize variants producing this disease in order to provide crucial information for the implementation of effective disease control strategies.

The investigation will involve isolation of fungi from samples of Sweet yam (*D. alata*) displaying symptoms of the yam anthracnose disease that will be collected across Jamaica. Fungi isolated will first be molecularly analyzed for relatedness to the *C. gloeosporioides* genome through the application of the DNA Barcoding technique. Specifically, the Internal Transcribed Spacer region of the fungal isolates will be assessed. Fungi identified as *C. gloeosporioides* will subsequently be molecularly characterized through DNA fingerprinting.

The pathogenicity of the strain(s) identified will be evaluated on tissue cultured Sweet yam (*D. alata*) and Yellow yam (*D. cayenensis*) plants. Additionally, the *C. gloeosporioides* strain(s) determined will be further morphologically described based on appearance on potato dextrose agar culture medium. This study is novel for Jamaica and the findings will be monumental in addressing the yam anthracnose epidemic.

Biotechnology Centre

Nikolai Lutas

Programme:	MPhil in Biotechnology
Field of Study:	Coffee Leaf Rust disease in farms across the Blue Mountains
Supervisor:	Dr. Cliff Riley
Co-supervisor:	Prof. Helen Asemota

The Blue Mountains is well known internationally for producing one of the most appealing coffee in the world. It is estimated that over 1000 families depend on coffee as a main source of income. Unfortunately, this important source of income is under threat due to the coffee leaf rust disease. The causative agent of the disease, *Hemileia vastatrix* has severely impacted the coffee fields of many farmers across the Blue Mountains. In some of the worst affected farms, the fungus has decimated the entire coffee field. Despite the fact that the disease has been present in the Blue Mountains for many years, the farmers in the region are still struggling to control the disease. Currently my research focuses on understanding the genetic diversity of *Hemileia vastatrix* and using it as a tool to aid in controlling the spread of the disease in the Blue Mountains.

Deiondra Robinson

Programme:	MPhil in Biotechnology
Field of Study:	Plant Pathology
Supervisors:	Prof. Paula Tennant and Prof. Marcia Roye

I completed a Bsc in Biotechnology and Pure Chemistry here at UWI Mona. I am currently enrolled as an MPhil student. My research entails the use of small RNA next generation sequencing to determine viruses infecting tomato, sweet pepper, and hot pepper.

Small RNAs are produced in the plant's attempt to degrade viral particles. By retrieving these small RNAs, via RNA extraction followed by DNA sequencing, we are able to assemble these short sequences to determine the infecting viruses. No prior knowledge of the infecting virus is needed for small RNA next generation sequencing, making it the ideal diagnostic tool.

So far we have found viruses previously reported in Jamaica, *Tobacco etch virus, Tomato yellow leaf curl virus, Potato Y virus* and *Cucumber mosaic virus*. Though previously identified, this study represents the first full length recovery and the first molecular characterization of each. Additionally viruses not previously detected in Jamaica including *Pepper leaf curl virus, Pepper vein yellow virus, Southern tomato virus* and *Bell pepper endornavirus* were detected.

Next generation sequencing is widely used globally for fast and reliable detection of pathogens. The use of this technology in Jamaica can afford us the ability to quickly identify and characterize plant viruses, so we can address them accordingly.

Biotechnology Centre

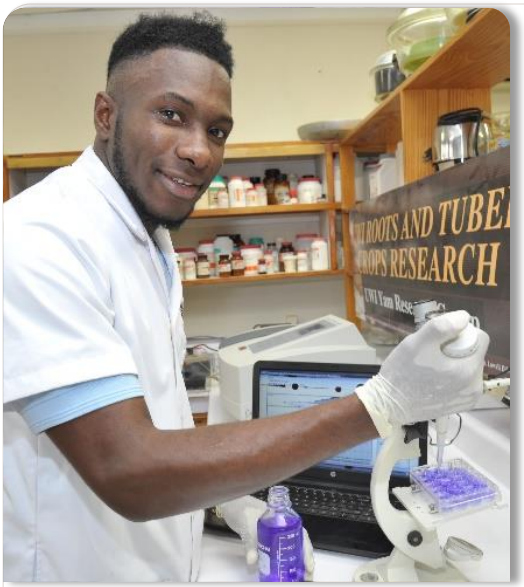
Venessa Williams

Programme:	MPhil in Biotechnology
Field of Study:	Medicinal Biotechnology
Supervisors:	Dr. Lisa Lindo, Prof. Wayne McLaughlin
Co-Supervisor:	Prof. Henry Lowe

I attained a BSc. in Biochemistry from the University of the West indies, Mona and am now currently pursuing an MPhil in Biochemistry. My supervisor, Dr. Lindo's area of interest is focused on the use of natural products for the treatment of diabetes and other chronic diseases. Chronic diseases are the leading cause of death and disability in the Western hemisphere. According to the Centre for Disease Control and Prevention (CDC) as of 2012 an estimated 117 million adults had one or more chronic health conditions, of which Diabetes Mellitus has an adult prevalence of 8.8%. *Cannabis sativa,* which is traditionally used in folklore medicine, has exhibited potential benefits for the treatment of hypertension, diabetes, asthma and several other illnesses.

The primary focus of this research, entitled "The Isolation and Purification of Extracts from *Cannabis sativa* (Marijuana) on Blood Glucose Concentration, Haemodynamic Parameters and Asthma in Sprague-Dawley Rats" is therefore to investigate the hypoglycaemic, hypotensive and smooth muscle relaxant properties of various parts of the plant as used in folklore medicine. Isolation, purification and elucidation of the bioactive compounds will be investigated.

I have been awarded a Research and Publication Grant from the Office of Graduate Studies and Research to assist with funding for equipment and supplies necessary for my research. Information generated from this research project should prove to be essential in the implementation of further studies with product formulation which are necessary to demonstrate the effectiveness of these bioactive compounds.



Chevaughn Witter

Programme:	MPhil in Biotechnology
Field of Study:	Medicinal Biotechnology
Supervisor:	Dr. Mohammad K. Ali (Dept. of Biochemistry)
Co-Supervisor:	Prof. Helen Asemota (Biotechnology Centre)

I completed my Bachelor's degree in Biochemistry (major) and Food Chemistry (minor) in 2015 at the University of the West Indies, Mona. I am currently pursuing my MPhil in Biotechnology in the Biotechnology Centre, Faculty of Science and Technology.

My supervisor, Dr. Mohammad K. Ali of the Biochemistry Department, Faculty of Basic Medical Sciences employs Zebrafish as the animal model to study the impact of both psychotic and non-psychotic drugs (herbal as well as synthetic) on performance, behaviour and development. Zebrafish (*Danio rerio*) is the animal model of choice in research due to its high (70%) genetic similarity to humans, high fecundity, ease of control, low price and low maintenance cost, and ease of monitoring organ development due to transparency (embryo to larval stage). With the guidance of my supervisor, my area of focus is evaluating the cardiovascular performance of psychoactive drugs such as alcohol, nicotine and cannabis on the heart rate and rhythm of Zebrafish.

These drugs are the most commonly abused recreational drugs used by Jamaicans; therefore, we want to find out exactly how they affect the heart rate and rhythm, and find out the mode of action on the heart whether through direct or indirect pathways.

Cardiovascular diseases have the highest mortality rate worldwide; testing how they affect the performance of the heart we can see where the population stands with the risk of developing cardiovascular disease. The results from this study can be translated to humans since the biochemical systems between the two are highly similar.

THE CENTRE FOR

ENVIRONMENTAL MANAGEMENT

Centre for Environmental Management

Thalia Balkaran

Programme: PhD in Environmental Management
Field of Study: Disaster Risk Management and
Supervisor: Dr. David Smith
Co-Supervisors: Dr. Barbara Carby, Dr. Arpita Mandal

I received my BSc degree in Geology and Geography from UWI, Mona Campus. I am currently pursuing a PhD at the Environmental Management Unit.

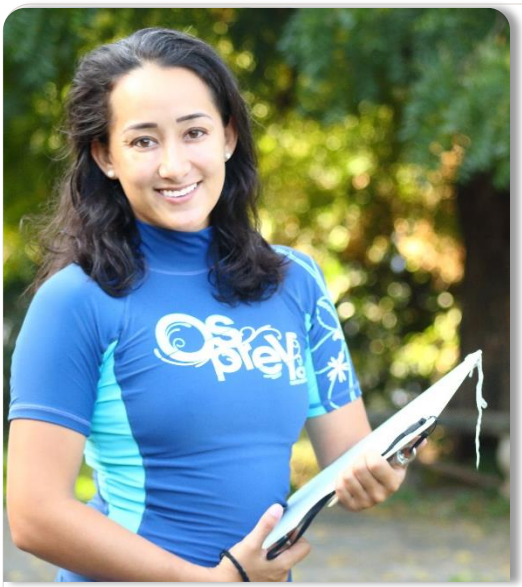
I am a former recipient of a scholarship from The Caribbean Catastrophe Risk Insurance Facility (CCRIF) and a current recipient of the EKACDM Scholarship.

My research places emphasis on tourism livelihoods and disasters in Small Island Developing States (SIDS). SIDS are vulnerable to climate-related hazards such as tropical cyclones which threaten critical economic sectors that are key income earners for these islands. Given the scientific predictions of increased intensity of hurricanes and tropical storms due to climate change, it is important to carry out research which can contribute to sustaining and protecting livelihoods in the tourism dependent Caribbean region.

My research entitled "Assessing the Vulnerability of Tourism-related Livelihoods to Tropical Cyclones in Small Island Developing States: a comparison of Tobago and Jamaica" places emphasis on livelihoods attached to Micro, Small and Medium Tourism Enterprises. A mixed methods approach was used to examine the social, environmental and economic factors contributing to vulnerability. A Tourism Livelihoods Vulnerability Index was also developed to allow comparison of vulnerability scores by site and gender.

I have presented my research at varying conferences on mixed methods, sustainable development and disasters. The most memorable included my attendance at the 2016 International Conference on Sustainable Development at Columbia University, and most recently at the 2017 Conference on the International Society for Integrated Disaster Risk Management in Iceland, of which I received an award to attend from the Research and Publications Fund and Graduate Awards.

It is my hope that the adaptation and policy recommendations made from my research can be used as a template across the region to put in place appropriate strategies to ensure the substantiality of livelihoods that depend on tourism.



Simone Lee

Programme: PhD. in Environmental Management
Field of Study: Economic Benefits of Jamaican Special Fishery Conservation Areas
Supervisor: Dr. Barbara Carby
Co-Supervisor: Dr. Donovan Campbell

Following my MSc degree in Marine and Terrestrial Ecology (MATE) from the University of the West Indies, I began working in the not-for-profit industry with a heavy focus on fishing communities and Special Fishery Conservation Areas (SFCA) in Jamaica and the Caribbean. I am currently pursuing a PhD in Environmental Management, studying the Economical Benefits of Jamaican Special Fishery Conservation Areas.

I will be examining the market values provided by the SFCAs and the marine habitats within them. I will be using new technologies for mapping habitats, and inputting ecosystem data and socio-economic data into Natural Resource Valuation models to estimate the value of these protected areas. The implications for the results of the study range from providing financial sustainability for SFCAs to improving the environment-development trade-offs currently experienced in Jamaica.

The Department of CHEMISTRY

Department of Chemistry

Annaleise Aiken

Programme: MPhil in Chemistry
Field of study: Food Chemistry
Supervisor: Dr. Ian Thompson

I completed my BSc (Hons.) in Food Chemistry in 2015 and commenced graduate studies in the same year. My MPhil project is titled "The Protein Quality and Functional Properties of Proteins Extracted from the Leaves of Jamaican and Colombian Varieties of Cassava (*Manihot esculenta*)". This project is done in conjunction with the UWI Agricultural Research and Innovation Facility in St. Elizabeth, managed by my supervisor Dr. Ian Thompson.

I am investigating the changes in leaf protein content and composition in Jamaican and Colombian varieties of cassava grown under different conditions and at different maturity stages. Additionally, I am testing the leaf proteins for functional and rheological properties which may be beneficial to food manufacturers. Plant protein concentrates and isolates are often used by food processors to make a protein claim for their product. Beyond this, the addition of some proteins may provide beneficial properties to the product by improving structure, texture, mouthfeel and other physical and chemical food characteristics. This research proposes that cassava leaf proteins may be exploited in this way. Cassava leaves account for a significant portion of post-harvest waste. I hope that this research may contribute to sustainable farming and the use of locally sourced food additives.

I am currently studying at the University of Toronto as an International Visiting Graduate Student, having received the Emerging Leaders in the Americas Program (ELAP) scholarship. I am working under the supervision of Prof. G. Harvey Anderson in the Department of Nutritional Sciences.

Sanjay Campbell

Programme: PhD in Chemistry
Field of Study: Marine Natural Products Chemistry
Supervisor: Dr. Winklet Gallimore

My introduction to research came at the undergraduate level where I was fortunate to undertake the CHEM3701 research project elective course. I honed my skills working with Dr Gallimore and got an appreciation of chemistry research concepts. This was the primary factor in my decision to undertake a research-oriented degree. I also felt the need to strengthen my skills and understanding of chemistry. The experimental nature of chemistry research has always appealed to me. After securing my Bachelor's degree in Food and Pure Chemistry, I continued my studies within the Department and enrolled in the Chemistry MPhil programme and after three years transferred my registration to the PhD programme with Dr Winklet Gallimore as my supervisor.

Natural compounds represent a rich reservoir of molecules showing promising bioactivity, which will most certainly lead to the further development of potent therapeutic compounds in the future. The ocean, which occupies just about three quarters of the surface of the planet, comprises a huge diversity of living organisms as such marine natural products continue to provide an unparalleled opportunity for driving creativity and discovery. My research focuses on the discovery of biologically active natural products from Jamaican marine organisms. Four species have been investigated including *Canistrocarpus cervicornis*, *Stypopodium zonale*, *Ochtodes secundiramea* and *Botrylloides perspicuum*.

I presented posters and short paper talks of this work at both regional and international conferences including SRC, 15th MaNaPro and Mona symposium 2014, 2016 and 2018. I have also published a paper on 'new oxodolastanes' obtained from *Canistrocarpus cervicornis* in the Journal of Marine Drugs.

These new oxodolastane natural products have shown anti-cancer effects. Thus our continuing research has provided evidence that Jamaican marine organisms can result in the discovery of natural products with possible benefits to mankind.

Department of Chemistry

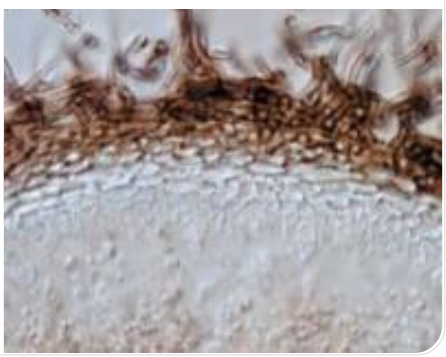
Oneiro Cherrington

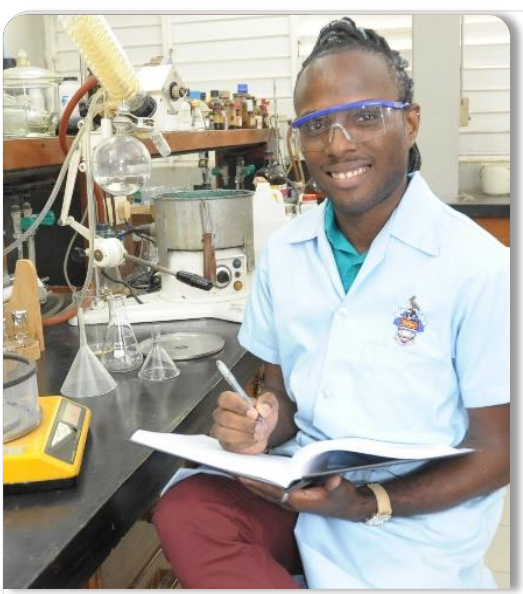
Programme: MPhil in Chemistry
Field of Study: Natural Products from the marine-based fungus *Paraconiothyrium cyclothyrioides*
Supervisor: Prof. Paul Reese

After completing my B.Sc. degree in Chemistry and Management from the University of the West Indies, Mona Campus I was employed as a Research Assistant. This exposed me to the intricacies of research, and created the platform that informed me about the many opportunities that the field had to offer. Filled with intrigue and a great desire to enhance my problem solving skills, I decided to enrol in the M.Phil programme in Chemistry under the supervision of Professor Paul Reese.

The project involves the application of epigenetic modifiers to enhance the biosynthesis of natural products from the fungus *Paraconiothyrium cyclothyrioides* with the aim of discovering novel compounds. Epigenetic modifications seek to trigger changes at the genome level without altering the DNA itself. Therein lies the potential for stimulating silent gene clusters, which can result in the production of new compounds with interesting biological activity.

With the current increase in drug resistance, there is a need for new pharmaceuticals. Accordingly, this project is uniquely designed to achieve this objective by utilising microorganisms isolated locally, as there is the potential for novelty. The results obtained from this project will provide a guide to the accession of novel natural products from previously underexplored sources and aid in the discovery of more potent pharmaceuticals.





Mario O. Christie

Programme: MPhil in Environmental Geochemistry
Field of Study: Water Quality in the Hope River Watershed
Supervisors: Dr. Robin Rattray and Dr. Arpita Mandal

I graduated with a Bachelor of Science degree (First Class Honours) with majors in in Food Chemistry and General Chemistry from the University of the West Indies, Mona Campus. I took up employment as Technical Manager at the ISO: IEC 17025 accredited Quality and Environmental Laboratory at Environmental Solutions Ltd. (ESL) which got me interested in water quality assessments and water resources management. Through dialogue with senior colleagues at ESL, I decided to conduct research into the impacts on water resources in the Hope River Watershed in partnership with them. The Hope River Watershed is home to several sectors including industrial/manufacturing and agriculture and is also home to 25% of Jamaica's population. Water is a necessity and at the rate at which the Kingston and St. Andrew is growing, it is necessary to assess the current state of the water resources in order to craft sustainable management practices to ensure future development in the area is not stymied. This study will also provide information that can be used by analytical testing laboratories and environmental consultants in their assessment of water quality and related data as it aims to improve current water resources management practises by providing a more integrated approach to water quality assessment.

Department of Chemistry

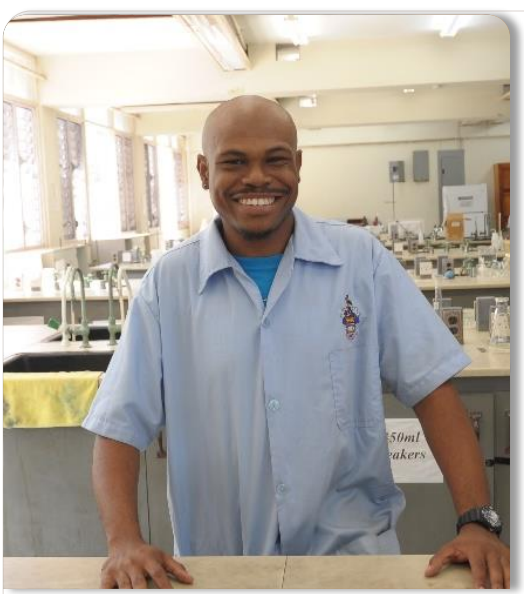
Kellyann Clarke

Programme: MPhil in Chemistry
Field of Study: Natural Products
Supervisor: Dr. Roy Porter
Co-supervisor: Dr. Petrea Facey

I completed my Bachelors of Science degree with a major in General Chemistry and a minor in Education at the University of the West Indies. Currently, I am pursuing an MPhil degree in Chemistry with an emphasis in Natural Products within the department of Chemistry under the supervision of Dr. Roy Porter and Dr. Petrea Facey. The research involves investigating the composition and bioactivity of essential oils from *Cannabis* and the endemic *Pimenta* species - *Pimenta richardii*.

Essential oils are typically volatile liquids containing aromatic compounds which allow plants to have a unique scent. These volatile liquids often have commercial value and are used in aromatherapy, medicines as well as in pesticides. Essential oils of various plants are presently being investigated for the diversity of aromatic components present in the oil and to determine its usefulness. The essential oil from *Cannabis* has been reported to be used to relieve anxiety and stress while the essential oils from *Pimenta* plants have been reported to have therapeutic properties such as anaesthetic, antioxidant and analgesic. Presently, there is interest in discovering new antioxidants from natural sources to prevent oxidative deterioration of foods.

Preliminary data from this research was presented at the 27thMona Symposium of Natural Products and Medicinal Chemistry, and at the University of the West Indies Research Days this year (2018). Further research will be performed on both plants to complete the characterization of the essential oil composition and its potency by utilizing various bioassays.



Kadane Coates

Programme: MPhil in Chemistry
Field of Study: Palaeoenvironmental Reconstructions
Supervisor: Dr. Debbie-Ann Gordon-Smith
Co-Supervisor: Dr. Michael J. Burn

I received by BSc. degree in Food Chemistry (Major) and General Chemistry (Minor) in 2015. My continued appreciation for Chemistry has led me to pursue a Master of Philosophy degree in Chemistry, with a focus on Environmental Chemistry and Geochemistry. The research element of my current post-graduate programme is multi-disciplinary and draws on knowledge from several fields primarily Geochemistry and Palaeoecology in order to understand how and why past environments have changed over time. In particular, my research thesis focuses on using approximately 3-metre long sediment cores retrieved from Hunts Bay, Kingston Harbour, Jamaica to understand how climate, pollution and other man made activities have disrupted the ecosystem dynamics of the harbour over the past 150-years. The information gleaned from this study has implications for current strategies aimed at the environmental restoration and rehabilitation of Kingston Harbour and is useful for future coastal zone and environmental management of the harbour, particularly in the context of a changing climate.

Department of Chemistry

Marc Collins

Programme: PhD in Chemistry
Field of Study: Bio-Organic and Natural Products Chemistry
Supervisor: Prof. Paul Reese

It is well known that natural products have potential as pharmaceuticals for the treatment of various diseases. Fungi are a rich resource for producing these compounds. Natural products (also known as secondary metabolites) from fungi have made an important contribution to managing disease in humans and other animals in the form of drug discovery.

My current project seeks to probe two marine-derived fungi: *Paecilomyces variotii* UAMH 10671 and *Aspergillus versicolor* UAMH 10674 in hopes of isolating and characterizing their potentially bioactive metabolites. Both fungi were isolated from the internal tissue of *Padina sanctae-crucis*, an alga growing in the Kingston Harbour, off the coast of Port Royal.

One of the major challenges in this process is the re-discovery of "known" compounds. In this investigation we seek to overcome this occurrence by employing new techniques, such as medium manipulation and epigenetic regulation to induce the production of novel metabolites. The biological activity of these compounds will also be investigated.

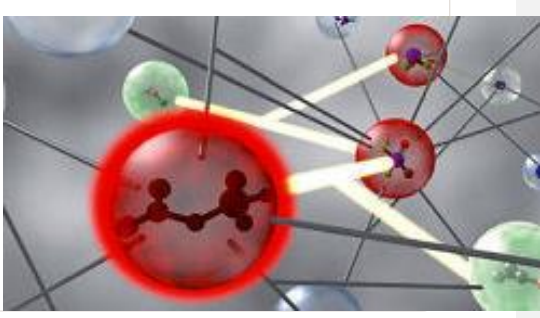
Shaunté Cotterell

Programme: MPhil in Chemistry
Field of Study: Organic Synthesis
Supervisor: Dr. Nadale Downer-Riley
Co-supervisor: Dr. Ainka Brown

As an undergrad I easily excelled in my studies. In my second year, I received the Bert Fraser-Reid award for my performance in the Advanced Organic chemistry courses CHEM 2210 and CHEM 3210. At the end of my second year, I worked as a summer research assistant and so developed a taste for research. In my final year, I received the Linnaeus-Palme grant to finalize my studies in Sweden, where I undertook the research project course CHEM 3711. This cemented my liking for research and also introduced me to my current field, organic synthesis. In the 2015/2016 academic year I completed my degree in Special Chemistry and in 2017/2018 I enrolled in the MPhil programme, under the supervision of Dr. Nadale Downer-Riley.

The Downer-Riley research group focuses mainly on the syntheses of aromatic heterocyclic compounds. My work involves the synthesis of the benzobisthiazole system. While little is known of the biological importance of benzobisthiazoles, they have been reported to be oxidative and thermally stable compounds that complex with many transition metals. These properties allow benzobisthiazoles to give rise to thermally robust materials which may find applications in solar and other photovoltaic cells.

I am currently exploring various routes towards the synthesis of the benzobisthiazole system. Once in hand the goal is to apply these compounds in known organic reactions to explore the effect of benzobisthiazoles on reaction selectivity. Since enrolling, I have presented a poster at the 27th Mona Symposium for Natural Products and Medicinal Chemistry in January 2018.



Department of Chemistry

Sharna-kay Daley

Programme: PhD. in Chemistry
Field of Study: Synthetic Organic Chemistry
Supervisor: Dr. Nadale Downer-Riley

The main focus of my research is the efficient synthesis of heterocyclic natural products by employing both a chemical and biomimetic approach. In exploring the biomimetic pathway, a study on the oxidative dimerization of benzene and naphthalene derivatives using new methods was conducted. The findings from the study have resulted in an alternate, cheaper and more efficient route to pharmaceutically relevant compounds.

Grants received:

- Office of Graduate Studies and Research, The UWI Mona, research and publication grant for poster presentation at FloHet-2014.
- Office of Graduate Studies and Research, The UWI Mona, research and publication grant for the purchasing of chemicals.

Selected conference abstracts:

1. Daley, S.; Jackson, Y.; Downer-Riley, N. The Concise Synthesis of Balsaminone A. 27th Bi-Annual Meeting of the Mona Symposium: Natural Products and Medicinal Chemistry, Kingston Jamaica 2018 (poster session).
2. Daley, S.; Jackson, Y.; Downer-Riley, N. Oxidative Dimerization of Benzene and Naphthalene derivatives: A Concise and Effective Route to Bioactive Natural Products. The 26th Bi-Annual Meeting of the Mona Symposium: Natural Products and Medicinal Chemistry, Kingston Jamaica, 2016 (short talk).
3. Daley, S.; Jackson, Y.; Downer-Riley, N. Approaches Towards a New and Concise Route for the Synthesis of Balsaminone A. FloHet-2014 Florida Heterocyclic and Synthetic Conference, Gainesville Florida (poster session).

Doleasha Davis

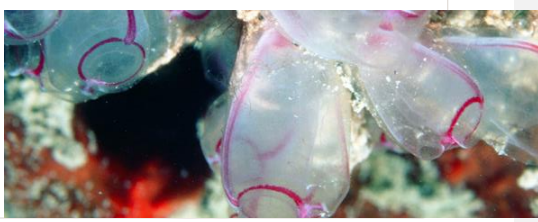
Programme: PhD. in Chemistry
Field of Study: Marine Chemistry
Supervisor: Dr Winklet Gallimore

I pursued my undergraduate degree at the University of the West Indies, where I obtained a Bachelors degree in Food Chemistry and General Chemistry (Hons.). After graduating, I decided to pursue a graduate programme in Chemistry and currently work with Dr. Winklet Gallimore.

My current project involves the study of the marine sponge, *Halichondria melanodocia, Plexuarella nutans, Clavelina picta* and *amphimedon compressa* and their related chemistry. It entails the use of various purification methods to obtain pure compounds, and elucidate their structures via spectroscopic methods, as well as to develop semi-syntheic products of the main components of the *Amphimedon compressa.* The bioactivities of different extracts, pure samples and semisynthetic derivatives are also tested with various cancer cell lines and microorganisms of regional and international interest.

During this programme, I have presented at various conferences such as the Mona Symposium on Natural Products and Medicinal Chemistry hosted by the Chemistry Department, University of the West Indies, Mona Campus (January 2014, 2016, 2018) and the Fifteenth International Symposium on Marine Natural Products (MaNaPro) in Cumbuco, Brazil. I have also been awarded 2nd place at the CariScience Regional Conference, Scientific Research Council, Jamaica, November 2017 and 3rd place at the 4th Biennial Conference & Expo, Scientific Research Council, Jamaica, November 2016 in their student poster competitions.

It is the hope that, through studying these under-studied specimens, this research will unearth novel and interesting compounds that will be of great economic significance in the pharmaceutical and agricultural industries.



Department of Chemistry

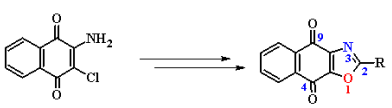
Marcel Denny

Programme: MPhil in Chemistry
Field of Study: Organic Synthesis
Supervisor(s): Dr. Nadale Downer-Riley

I obtained my First Class Honours BSc degree in Food Chemistry (double minor in General Chemistry and Management Studies) from the University of the West Indies Mona in 2016. As an undergraduate I received several awards such as the Wilfred Chan award for excellence in Organic Chemistry in 2015 and Diamond status in Chemistry Honour Society 2016. My passion for Chemistry drove me to pursue further studies. Currently I am an MPhil candidate within the Chemistry department where my focus is on the synthesis of 2-substituted naphthoquinone[2,3-*d*]oxazoles.

Naphthoquinones are crucial structures within the field of medicinal chemistry due to their many and varied biological activities. The incorporation of a heterocycle onto the quinone ring to produce tri- and tetracyclic cores has been shown to enhance cytotoxicity. We are interested in preparing naphthoquinone oxazoles which have demonstrated antibacterial and anticancer activity.

To date, only a few oxazoles derivatives of naphthoquinone have been made with their preparations requiring harsh conditions such as strong acid and/or high temperature. My project is geared towards the synthesis of 2-substituted naphthoquinone[2,3-*d*]oxazole derivatives using milder conditions that can also easily generate a library of compounds. Once synthesized, biological assays will be done to investigate the Structure Activity Relationship (SAR). This work has the potential to discover new drug lead compounds. So far, I have prepared five of these oxazoles derivatives and this work was presented at the 2018 Mona Symposium-Natural Products and Medicinal Chemistry where my poster was awarded honorary mention.



Raylee St. W. Dunkley

Programme: MPhil in Chemistry
Field of Study: Acetylated Cassava Starch
Supervisor: Dr. Ian Thompson

I completed my Bachelor of Science in Chemistry (Major: Food Chemistry, Minor: General Chemistry) at the University of the West Indies, Mona in 2015. My research project is entitled "An Evaluation of the Functional Properties of Acetylated Cassava (*Manihot esculenta* Crantz) Starches". The aim of the research is to analyse the physicochemical structure of starch from cassava varieties grown in Jamaica that has had limited research.

Cassava is one of the most widely grown tubers due to the high starch content and its high drought resistance. Cassava starch has several unique qualities that see them being used in several industries (food, pharmaceutical, textiles, paper, lumber etc.). These qualities can however be improved on with chemical modifications such as acetylation. The results of this research will lead to a greater understanding of the properties of starch (native and modified) and will give direction to the areas these specific starches can be best utilized. It is expected that with an increase in the usage of these starches, there will be a potential decrease in the importation of starches.

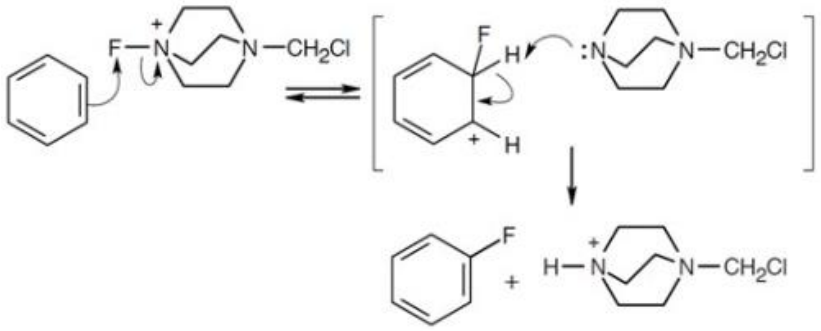
Department of Chemistry

Natasha Dyer

Programme: MPhil in Chemistry
Field of Study: Organic Chemistry
Supervisor: Dr. Nickeisha Stephenson

I graduated from the University of the West Indies in 2015 with a BSc degree in Chemistry with first class honours. I entered the graduate programme in 2015 to pursue a Master of Philosophy degree in Chemistry. I am currently working with Dr. Nickeisha Stephenson on a project that involves discovering new ways of incorporating fluoride into organic molecules. Fluorine containing molecules are of great importance to the pharmaceutical and agrochemical industries.

Known fluorination methodologies suffer from limited substrate scope or require reaction conditions that are incompatible with sensitive and complex organic molecules such as peptides. The main focus of our research is to develop a mild fluorination methodology that can be used to fluorinate these types of complex biomolecules and natural products.



Shaquina K. Francis

Programme: MPhil in Chemistry
Field of Study: Bayer Process Chemistry
Supervisor: Dr. Michael D. Coley

I grew up in a community that is close to one of Jamaica's well-known bauxite-alumina plants. While pursuing the BSc. Applied Chemistry degree at the University of the West Indies, Mona, I was exposed to technical aspects of bauxite/alumina processing and soon decided that I wanted to invest my time and talents into solving some of the challenges that local bauxite-alumina plants encounter. I enrolled into the Master of Philosophy programme, in the Department of Chemistry under the supervision of Dr. Coley and began work aimed at understanding the impacts of impurities on alumina quality and eventually, to predict alumina quality based on the processing conditions in the plant.

The main goal of an alumina plant is to make product of exceptional quality. This is difficult to achieve, however, due to the complexity of the Bayer process and the numerous parameters that impact the operations. Processes have been designed to help reduce impurity impacts and models have been developed to predict alumina yield and quality, however Jamaican bauxites are unique and the models available do not adequately predict their behaviour. My research seeks to study the effects of bauxite impurities on alumina quality and to develop a mathematical model to predict alumina yield and particle size distribution under plant conditions.

Status of work: So far, a suitable equation has been established to model alumina precipitation and experimental data is now being generated to test and eventually optimize the model. Significant hurdles remain, however I am confident that they can be surmounted.

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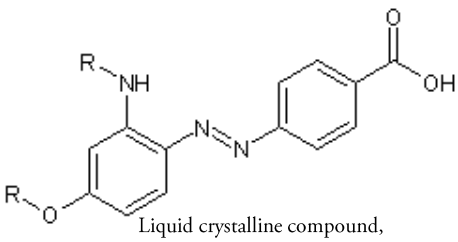
Department of Chemistry

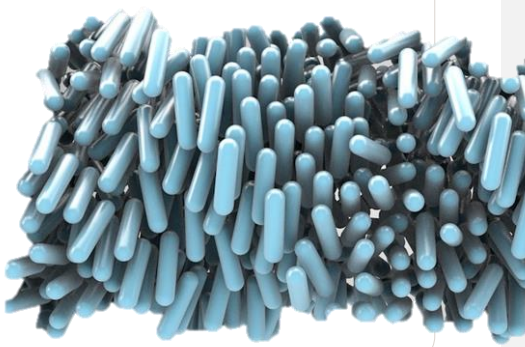
Kriss-Ann Graham

Programme: MPhil in Chemistry
Field of Study: Bayer Process Chemistry
Supervisor: Dr. Michael D. Coley

The need for new materials, displaying tunable properties, is vast and continues to grow. Of-course, this growing call for the development of new advanced materials has not been going answered, as indicated by rapid developments in areas such as thin films, molecular self-assembly and nano-materials. However, the advancement of biologically friendly smart materials, capable of responding to changes in their environment, has not seen much progress where application is concerned. Therefore, in this project, we are focused on the development of several model low temperature liquid crystalline materials (see figure); capable of exhibiting stimuli responsive phase switching behavior for the controlled release of small molecules. The development of such systems is aimed at realizing the tremendous application potential of liquid crystals and creating a tool box for the assembling of long term stimuli activated drug reservoirs in biological systems.



Liquid crystalline compound, currently be investigated



Sonal Gupte

Programme: MPhil in Chemistry
Field of Study: Investigation of Jamaican Plant Extract to be Used as Rennet Substitute in Cheese Making
Supervisor: Dr. Ian Thompson
Co-Supervisor: Prof. Helen Asemota

Rennet is one of the most important components in cheese making with its specificity to hydrolyse 105-106 Phenylalanine and Methionine bond of k Casein. Moreover, there is an ever increasing demand for rennet substitute as cheese production is increasing throughout the world and calf rennet – a critical ingredient – is unable to meet this demand. Also there is need for rennet from plant sources because of vegetarianism and the cheese labelled as "Vegetarian Organic" cannot be manufactured using Genetically Modified Enzyme.

With reference to Jamaica, as per Statistical Institute of Jamaica, Jamaica imported nearly 4500 tons of cheese in 2015 amounting to nearly 24 million USD. With reference to this, Jamaica has potential to increase the existing milk production and produce its own Cheese. My Research involves finding suitable plant source which could be used to as a substitute to calf rennet to manufacture cheese.

I possess a Bachelor of Technology in Dairy Technology from India and have more than 16 years' experience in the Indian Dairy Industry. With this background, it is my endeavour to reduce partial burden on the Jamaican economy by manufacturing mozzarella cheese locally, utilizing the milk produced in Jamaica and incorporating rennet that is extracted locally from the plant source.

I have screened nearly 50 plants and have found two to be potential sources possessing Milk Clotting Activity. Out of these two sources, have purified one of the plant crude extract and will access its ability to manufacture cheese.

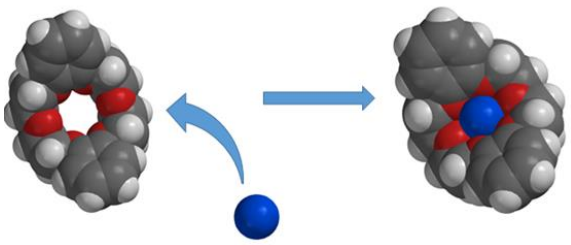
Department of Chemistry

Deneikah Jackson

Programme: MPhil in Chemistry
Field of Study: Materials Chemistry – Design and synthesis of high efficiency Ca^{2+} and Pb^{2+} Selective membranes
Supervisor: Dr. Peter Nelson

Ion selective membranes (ISMs) have been the centre of much research interest for several decades, owing to their application potential in clinical, environmental, food and other analytically based industries where they offer the ability to rapidly detect and quantify various ionic pollutant species; some of which are highly toxic. Despite the noteworthy experience of these materials, however, underlying problems such as selectivity and sensitivity continues to limit their application.

Tis study aims to design, synthesize, model and characterize several high efficiency Ca^{2+} and Pb^{2+} selective membranes based on polymeric dibenzo-18-Crown-6 derivatives. This is important since lead (II) ion (Pb^{2+}), which plays no major role in biological systems, is highly toxic/disruptive to numerous biological processes. However, the role of calcium ions (Ca^{2+})in biological processes such as cell signalling, blood clotting, electrical impulse conduction, muscle contraction and nerve function can only be described as critical. Hence, rapid and accurate analysis of both species offers a pathway for efficient and effective diagnosis and hence, treatment of several ailments.



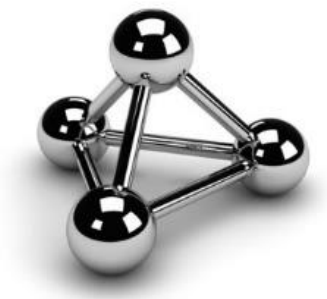
Typical Interaction of Dibenzo-18-Crown-6 with metal ions

Shannen Lorraine

Programme: PhD in Chemistry
Field of Study: Organometallic Catalysis
Supervisors: Dr. Paul Maragh, Dr. Kamaluddin Abdur-Rashid, Prof. Tara Dasgupta

Organometallic Catalysis has been the focus of academic and industrial research from as early as the 18th century. It represents cutting-edge research aimed at providing access to synthetic chiral intermediates for use in the pharmaceutical, fragrance and flavours industries. The current goal of asymmetric catalysis is the development of 'green catalysts' capable of reciprocating the processes of the largest biochemical reactor – *NATURE*. To this end, the use of water or alcoholic medium as solvent and recyclable transition metal complexes are being pursued. This green chemistry initiative reduces the number of volatile organic compounds (VOCs) released in the environment.

Our research entails the synthesis of novel biaryl diphosphine transition metal complexes having rhodium(I), iridium(I), ruthenium(II), palladium(II) and copper(I) metal centres. These novel complexes have demonstrated high efficiency in numerous catalytic transformations such as asymmetric hydrogenations, asymmetric transfer hydrogenations, Suzuki Miyaura cross-couplings and hydrosilylations. So far, these pre-catalysts have demonstrated remarkable activity affording the chiral products in moderate to good enantioselectivities.



Department of Chemistry

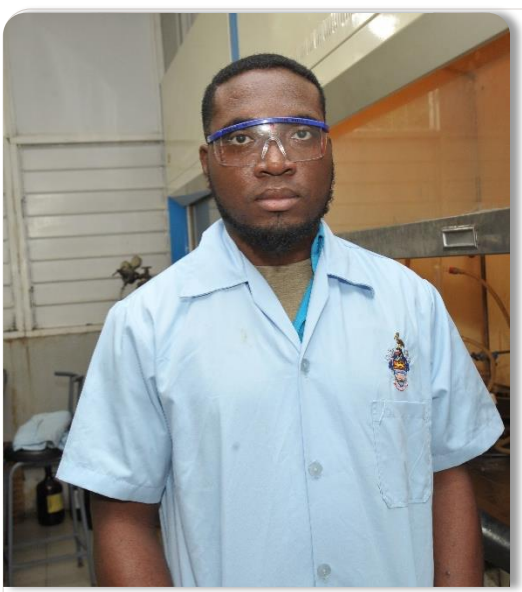
Jordan McKenzie

Programme: MPhil in Chemistry
Field of Study: Natural Products Chemistry
Supervisor: Prof. Paul B. Reese

I graduated from The University of the West Indies, Mona Campus in 2016 with a Bachelor of Science degree in Chemistry and Economics. At the undergraduate level I was fortunate to be recruited as a project student for two summers where I understood and came to an appreciation of what was required to do research in Chemistry. This initial exposure was the determining factor which led to my enrollment into the post-graduate programme.

Under the supervision of Prof. Paul Reese, currently in my second year, I have been investigating the biotransformation of testosterone using immobilized filamentous fungi. For over half a century microbial transformation has remained an area of increasing interest due to the facile conversion of substrates to oxygenated analogues, and its economic advantages over the use of isolated enzymes. The technique employed in this project also provides a suitable alternative to chemical synthesis which may prove to be difficult, and allows for the generation of a library of compound-analogues. The seven fungi involved in the investigation are: *Actinomucor elegans*, *Aspergillus ochraceus*, *Beauveria bassiana*, *Calonectria decora*, *Mucor circinelloides*, *Penicilliun chrysogenum* and *Rhizopus stolonifer*. This undertaking has shown promising results, in the literature, for producing a wide variety of analogues from steroidal substrates.

The aim of this study is to determine the pathway by which testosterone is transformed in a fermentation containing two different fungal cultures. This will likely shed light on the unique conversion properties of a combination of microorganisms used, and perhaps allow for more selectivity in targeting compounds which may be of biological interest.



Dwight Messam

Programme: MPhil in Chemistry
Field of Study: Atmospheric Chemistry
Supervisors: Dr. Novelette Sadler-McKnight ; Prof. Johan Boman

I graduated from the University of the West Indies, Mona in 2011 with a degree in General and Food Chemistry major with Upper Second Class Honours. During my tenure at the UWI Mona my introduction to research came in the form of CHEM3701 which is a research project that is offered to exceptional undergraduate students within the department of chemistry, from there my interest in research grew enormously. I returned to UWI Mona in September of 2015 and started my postgraduate degree in the area of atmospheric chemistry. Air Quality Standard (AQS) within first world countries in comparison to third world states, such as Jamaica are far advanced. The potential for Jamaica to establish an AQS, has come a long way, the National Environmental Planning Agency (NEPA) has put in place limits for trace chemical species 10 micrometers in size, but particles 2.5 micrometers and lower have greater cardiovascular and pulmonary health risk and this fundamentally is the focus of my research, which is the characterize and assess there impacts on health. My development as a researcher at UWI Mona was further enhanced, thanks to the Erasmus Student Scholarship programme which allowed me to analyze samples for trace elements and organic content in 2017 at the University of Gothenburg Sweden. Being a graduate student is fulfilling; learning new methods and techniques in atmospheric sciences and contributing to the development of greater awareness about climate change and associated health risk.

Department of Chemistry

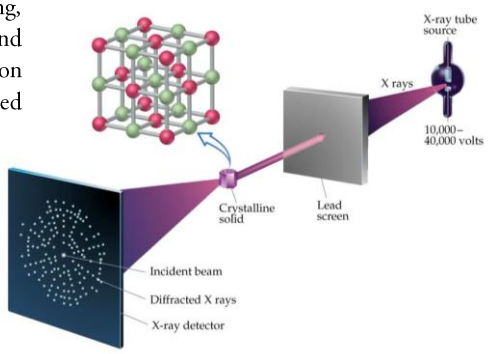
Kadane Morris

Programme: MPhil Chemistry
Field of study: Asymmetric Catalysis
Supervisors: Dr. Paul Maragh, Prof. Tara Dasgupta, Dr. Kamaluddin Abdur-Rashid

Having received the Bachelor of Science (Special) degree in Chemistry, I decided to further develop my knowledge through the MPhil programme in the Department of Chemistry in 2016. As a member of the Organometallics Chemistry group, I have been given the opportunity to work with transition metal catalysts namely: aminophosphine ruthenium and rhodium complexes. Results were presented in the form of a poster at the Mona Symposium on Natural Products and Medicinal Chemistry in January 2018.

The application of these complexes can be seen in many industrial, flavouring, fragrance and pharmaceutical processes and have the potential to reduce the production costs, as such, much focus has been geared towards understanding and developing these complexes as catalysts for hydrogenation, transfer-hydrogenation, isomerization and carbon-carbon coupling reactions, to name a few.

My current project is entitled *The Synthesis of Active Pharmaceutical Intermediates (APIs) using Cationic Rhodium and Ruthenium Aminophosphine complexes.* Characterization of these complexes will be achieved using ^{1}H-, ^{13}C- and ^{31}P-NMR spectroscopy, Infrared Spectroscopy, CHN analysis and Single Crystal X-ray Diffraction.



Ricaldo Pryce

Programme: MPhil in Chemistry
Field of Study: Natural Products Chemistry
Supervisor: Prof. Paul Reese

My thesis "The Chemistry and Biological Activity of Stemodane Diterpenes and their Analogues" encompasses aspects of chemical synthesis as well as 'green chemistry', in the form of fungal incubations with natural product analogues.

The main natural product involved in my project is stemodin, which was isolated from the coastal plant *Stemodia maritima.* Stemodin is an antiviral and cytotoxic compound which is produced in large quantities by the plant. It belongs to the diterpene family of natural products, substances which contain twenty carbon atoms.

The investigation involves chemical synthesis to generate several analogues of stemodin, two of which have been shown to induce the biosynthesis of a novel natural product when incubated with fermentations of the fungus *Beauveria bassiana.* These analogues will be fed to a number of fungi, growing in liquid culture media, to determine the scope and limitations of their ability to generate secondary metabolites in these organisms. This opens up the possibility of generating new natural products with biological activities that could be of benefit to mankind.

Department of Chemistry

Mark Rambaran

Programme:	MPhil in Chemistry
Field of Study:	Colloid and Interface Science
Thesis Title:	The Effect of Ions on the Physicochemical Properties of Silica Nanoparticles in 1:1 and 1:2 Electrolyte Solutions
Supervisors:	Prof. Willem Mulder (UWI, Mona), Prof. Zareen Abbas (University of Gothenburg, Sweden)

I received a BSc. in Special Chemistry from the University of the West Indies, Mona Campus (UWI, Mona) and subsequently embarked on postgraduate studies via a collaboration between the UWI, Mona and the University of Gothenburg (GU), Sweden.

During my postgraduate studies I was the coordinator of the Peer Led Team Learning Programme (PLTL) offered by the Department of Chemistry (2015-2017) and I was also awarded the UWI Postgraduate Scholarship (2016-2017), along with research grants (2016 and 2017) from the Office of Graduate Studies and Research (OGSR).

I have presented my work at the 26th Mona Symposium at the Department of Chemistry, UWI, Mona (January 2016) and the 46th World Chemistry Congress, IUPAC 2017 in São Paulo, Brazil.

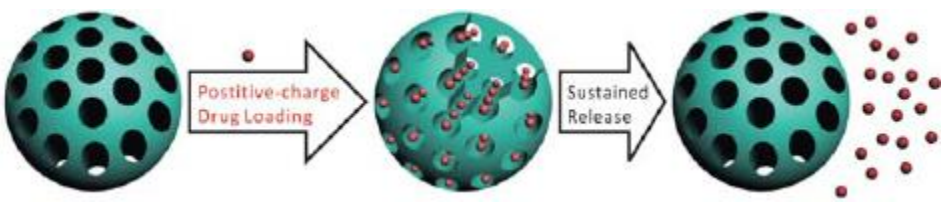
Research Activity

Surface charge density (σ) and zeta potential (ζ-potential) are physicochemical properties of silica nanoparticles (SNPs). They are dependent on the surface complexation equilibrium established through the protonation/deprotonation of surface bound neutral silanol (≡Si−OH) groups. SNPs were characterised through potentiometric and electrokinetic measurements. The effect of ion adsorption on σ was probed via potentiometric measurements by varying bulk pH and salt concentration of LiCl, NaCl, KCl, RbCl and CsCl (cationic effects); NaCl, $NaClO_4$ and Na_2SO_4 (anionic effects). The effect of ion adsorption on ζ-potential was studied via Laser Doppler Velocimetry (LDV) to elucidate cationic and anionic effects at the silica-water interface, in effort to corroborate results from σ. The σ increased with pH, salt concentration and cationic radius; similar to the ranking of the Hofmeister series of cations: $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$.

Unlike σ, the ζ-potential became less negative with an increase in electrolyte concentration. Increase in pH and cationic radii corroborated an increase and decrease in ζ-potential, respectively. Diminution of ζ-potential followed an increase in cationic radius according to the Hofmeister series of cations. Cation adsorption was assumed to be enhanced by chaotropicity, polarisability and dispersion interactions. Altogether these facilitated their ability to promote charge-screened deprotonation for surface charge development. Anionic effects on σ have previously been assumed negligible for pH >3, however at pH 8-10 the σ decreased relative to an increase in anionic radius, polarisability and anion-cation dispersion interactions for SNPs at all electrolyte concentrations, in accordance with the Hofmeister series of anions: $Cl^- > ClO_4^- > SO_4^{2-}$.

Conversely, the ζ-potential became more negative under similar conditions relative to the Hofmeister series of anions; this being most apparent for all electrolyte concentrations at pH 8-10. The repulsion of the anion from the silica surface was assumed to decrease with an increasing anionic radius, polarisability and anion-cation dispersion interactions. The more polarizable anions possessed stronger anion-cation dispersion interactions which were assumed to facilitate a shortening of the anion-cation interionic distance, thereby inhibiting cation adsorption and charge-screened deprotonation. This yielded a less negative σ, while promoting a more negative ζ-potential. Hence, anionic effects were determined to be present and influential on σ and ζ-potential of SNPs, despite previously being assumed negligible.

This research furthers the understanding of the Hofmeister series and ion specific effects on SNPs and therefore allows to expand our applications of nanoparticles in drug delivery and surface coatings.



Department of Chemistry

Alexa Redway

Programme: PhD in Chemistry
Field of Study: Synthetic Organic Chemistry
Supervisor: Dr. Nadale Downer-Riley

In 2009, I was awarded my B.Sc. degree in Chemistry and Biochemistry from the University of the West Indies, Mona. After two years of cultivating my passion for teaching as a Chemistry teacher at the St. Mary High School and as a Full-time Demonstrator in the Department of Chemistry, I enrolled in PhD programme. As a Ph.D. candidate in the Department of Chemistry, I focus on exploring "Synthetic Strategies to Benzothiazole and Azacoumarin Alkaloids."

I was the recipient of the Wilfred Chan award for excellence in Organic Chemistry in 2009. I also received Best Oral Presentation at the 2015 staging of Faculty of Science and Technology Conference and I was awarded 2nd Place in Poster Competition at the 26th Mona Symposium held in 2016. I have made oral presentations on my work at the 2012 Department of Chemistry Seminar Series, the 25th (2014) and the 27th (2018) Mona Symposium and the 2015 staging of the Faculty of Science and Technology Conference. I have presented posters on my work at the Florida Heterocyclic conference in Gainesville, Florida in March 2014, the 25th and the 26th Mona Symposium and the 2016 UWI Research Days. I was also the beneficiary of two grants from the Office of Graduate Studies and Research in 2013 and 2014.

Under the supervision of Dr. Nadale Downer-Riley, I utilize existing and new methodologies towards assembling the natural product, violatinctamine isolated from a Kenyan marine tunicate in 2004. The successful synthesis of the core of this natural product, which contains two bioactive units, its analogues and its intermediates, will provide well-needed material for bioactivity and structure activity relationship studies. With the global pharmaceutical market being valued at 816 billion in 2016, this work and related research areas have the potential to drive income generation at the University, national and regional levels.

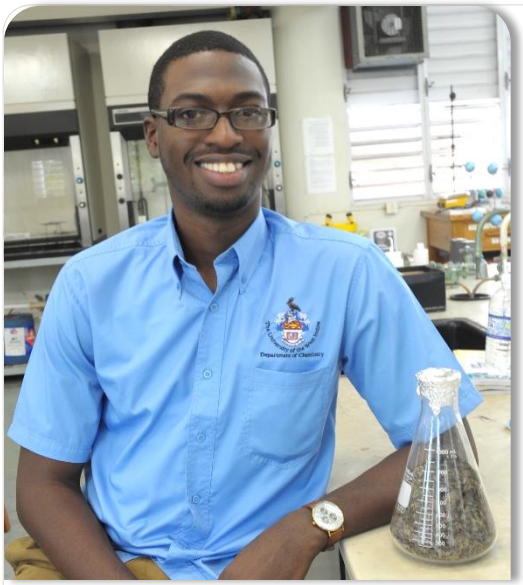
Abigail Richards

Programme: MPhil Chemistry
Field of Study: Marine Chemistry
Supervisor: Dr. Debbie-Ann Gordon-Smith

I received a BSc degree in Applied Chemistry and Management Studies from the University of the West Indies, Mona in 2016. I am currently a Master of Philosophy Candidate. My research aims to determine the magnitude and impact of submarine groundwater discharge (SGD) to selected sites along the coast of Jamaica using radon and radium isotopes as natural tracers. SGD can be defined as groundwater flowing out across the sea floor from sediments, as diffuse seepage, underwater springs or deep continental flows and represents an important pathway for land-based chemical species to coastal zones. Understanding SGD and its impact on nutrient budgets in the marine environment has implications for understanding the impact of anthropogenic-induced events, including eutrophication, on coastal aquatic systems. Water samples are analysed for dissolved ammonium, nitrate+nitrite, soluble reactive phosphorus and silicate, total dissolved nitrogen and phosphorus at the Department of Chemistry (UWI)'s Environmental Research Laboratory and stable isotope ratios of nitrogen and oxygen (δ15N, δ18O) in nitrate at the Stony Brook University. The δ18O/δ15N ratios vary depending on the inputs from natural sources, fertilisers, manure and sewage and thus will be used to identify the major sources of nitrate in groundwater.

Results from studies conducted in the Caribbean and other small island developing states (SIDS) have indicated SGD as a significant source of nutrients to their delicate coastal zones. However, the extent of groundwater discharge and nutrient inputs to these islands are still largely unknown. This knowledge is of critical importance to Jamaica and other SIDS as these countries depend on their vulnerable marine ecosystems for food, employment and coastal zone protection. So, from my work a detailed map of SGD and associated nutrient inputs along the coast of Jamaica will be created to identify "hot" spots for SGD and nutrient enrichment. This type of information will be useful to different regulatory bodies as it will help to monitor, sustain and or improve the water quality of different marine ecosystems.

Department of Chemistry



Coniel Roye

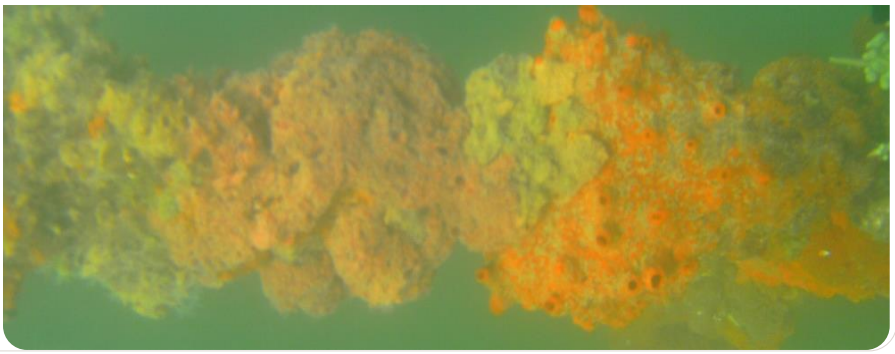
Program: PhD in Chemistry
Field of Study: Natural Product Chemistry
Supervisor: Dr. Winklet Gallimore

In 2013, I obtained my BSc degree in food chemistry with a minor in environmental chemistry from the University of the West Indies, Mona. I was the beneficiary of the UWI Regional Endowment Fund scholarship for the academic year 2012/2013. Currently, I am pursuing a PhD degree in Chemistry with Dr. Winklet Gallimore as my supervisor. My research entails the isolation, elucidation and bioactivity studies of secondary metabolites from a marine sponge (*Tedania ignis*), ascidian (*Botrylloides perspicuum*), gorgonian (*Pterogorgia anceps*) and a plant (*Mallontonia gnaphalodes*).

This research has yielded several compounds with promising anticancer activity against several cancer cell lines.

My work has been presented at the following conferences:

1. The Mona Symposium - Natural Products and Medicinal Chemistry, Chemistry Department, UWI (2014, 2016 and 2018)
2. XV International Symposium on Marine Natural Products (MaNaPro), Cumbuco, Brazil, August 2016.



Littlelet Scarlet-Banks

Programme: PhD in Chemistry
Field of Study: Asymmetric Catalysis
Supervisors: Dr. Paul Maragh, Prof. Tara Dasgupta, Dr. Kamaluddin Abdur-Rashid

Having received a Bachelor of Science (B.Sc) degree in Chemistry and Biotechnology, my hunger to expand my knowledge and research skills in the field began to expand. After this, enrolling in the Master of Philosophy (MPhil) programme in the Department of Chemistry in 2012 was the next climb up the ladder and successfully completing the MPhil upgrade process in May, 2016. As a member of the Organometallic Chemistry Research Group, emphasis has been placed on the synthesis of potential chiral transition metal catalysts containing either aminophosphine or phosphine iminopyridine ligands. To date, remarkable results have emerged which were presented at academic conferences both locally and internationally, namely; Mona Symposium on Natural Products and Medicinal Chemistry as well as The National Meeting of the American Chemical Society. These accomplishments have been made possible by grants received from the Office of Graduate Studies and Research. Asymmetric catalysis is a rapidly growing area as there is an increased demand of enantiopure compounds applicable to Organic synthesis in the pharmaceutical, fragrance, flavouring and agricultural industries. Chiral mixed ligand systems, containing phosphorus and nitrogen, is now the focus of many research groups as a result of steric and electronic effect. They have a unique combination of hard (amine) and a soft (phosphine) Lewis base centres and are able to stabilize metal ions in both high and low oxidation states. The unique steric and electronic properties of these ligands have prompted us to formulate a research project entitled "*Synthesis, characterization and application of chiral ferrocenylaminophosphine ($PPFNH_2$), tetrahydronaphthalene aminophosphine ($THNANH_2$) and phosphine iminopyridine (PPFNPy) transition metal complexes.*" Characterization of these complexes is achieved using ^{1}H, ^{13}C and ^{31}P-NMR spectroscopy, Infrared Spectroscopy, CHN analysis and Single Crystal X-ray Diffraction. I will continue to strive for excellence and look forward to more ground breaking discoveries and several publications in peer-reviewed journals.

Department of Chemistry

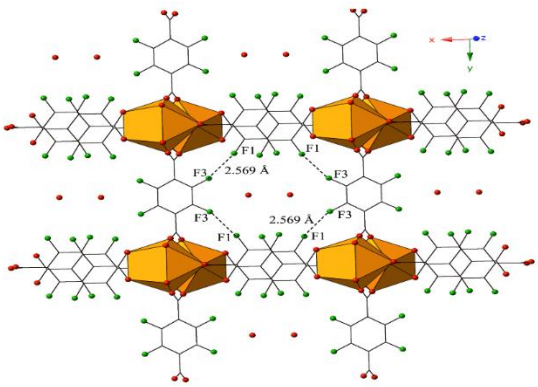
Jermaine A. Smith

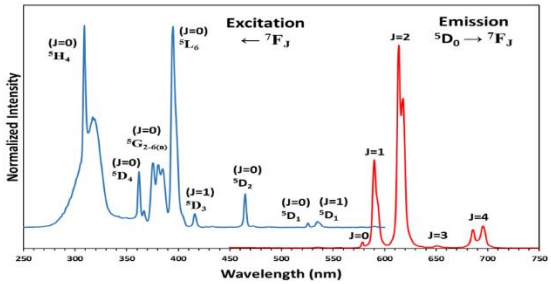
Programme: PhD in Chemistry
Field of Study: Organic-Inorganic Hybrid Materials
Supervisor: Dr. Marvadeen Singh-Wilmot

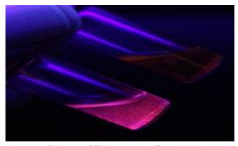
I am a PhD student in Inorganic Chemistry under the supervision of Dr. Marvadeen Singh-Wilmot. Our area of focus is the synthesis, characterization and potential applications of hybrid organic-inorganic materials called Metal-Organic Frameworks (MOFs). MOFs are a new class of porous coordination polymers (CPs) with well-defined topologies that continue to intrigue scientists not only because of their appealing structural architectures, but also because of their potential applications in gas storage and separation, sensing of small molecules, catalysis and biomedicine.

The synthesis of MOFs using rare earth (RE) metal ions is still relatively under explored when compared to transition metal-based systems, due to their unpredictable coordination chemistry. There are however significant advantages to be gained by combining the unique catalytic, magnetic and light emitting properties of RE metal ions with the properties of MOFs.

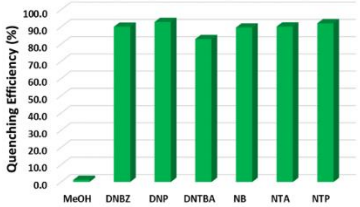
By combining rare-earth metal ions with dicarboxylate ligands we have been able to create novel RE-CPs and RE-MOFs having interesting structural, luminescent and sensing properties. In our first publication which was partially funded through a Research and Publications grant obtained in 2014, we demonstrated the versatility of the 2-nitroterephthalic acid ligand as a building block for constructing novel RE-CPs and RE-MOFs and the potential of these compounds as gas storage materials. We plan to expand this study by using other closely related ligands to form isoreticular families of RE compounds that have the same topology but systematically tuned properties. Isoreticular RE-CPs and RE-MOFs are uncommon in the literature and in our bid to rationally design these compounds, we have formed new structures with the tetrafluoroterephthalic acid and tetrabromoterephthalic acid ligands. Although these RE-CPs are not isoreticular, their structural and luminescent features are intriguing as they have the potential to be used as solid-state light emitting materials and fluorescent sensors for metal ions and explosive nitroaromatic compounds. The study of these systems brings us a step closer to the rational synthesis of RE-CPs and RE-MOFs having desired structures and applications.



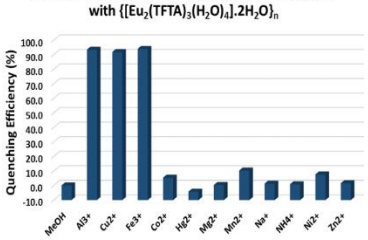




Quenching Efficiency of NACs upon interaction with $\{[Eu_2(TFTA)_3(H_2O)_4].2H_2O\}_n$



Quenching Efficiency of metal ions upon interaction with $\{[Eu_2(TFTA)_3(H_2O)_4].2H_2O\}_n$



Department of Chemistry

Romario Smith

Programme: MPhil in Chemistry
Field of Study: Natural Products Chemistry
Supervisor: Dr. Roy Porter

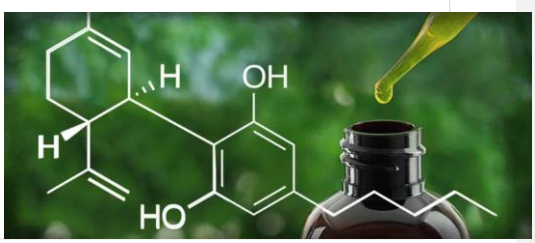
I obtained my BSc. in Chemistry (Special) from The University of the West Indies, Mona, before starting my MPhil in Natural Products Chemistry, under the supervision of Dr. Roy Porter. My research, is on the isolation and biotransformation of phytocannabinoids using endophytic fungi isolated from the cannabis plant.

The *Cannabis* plant is a member of the Cannabaceae family, which is best known for its psychoactive properties associated mainly due to phytocannabinoids, such as D^9-THC. In recent years, the non-psychoactive constituents of the plant, such as cannabidiol (CBD), cannabigerol (CBG) cannabichromene (CBC) have gained popularity for their medicinal properties.

Some cultivators of the cannabis plant have developed high CBD:THC strains which are used to treat various diseases such as pain, nausea and muscle spasms, associated with Parkinson's Disease and epilepsy. Most of the literature surrounding biotransformation of cannabinoids, is on D^9-THC, however, there are many more cannabinoid substrates to explore.

Endophytes are endosymbiont which live within a plant and can produce biologically active compounds similar to the secondary metabolites of the host plant. In my research, endophytes will be isolated from the plant and fermented with cannabinoid substrates to produce analogues, which will be screened for their biological activities.

This study is geared towards finding an easy, economic and green way of preparing biologically active compounds which could be used in drug development and was presented at the 27th staging of The Mona Symposium on Natural Products and Medicinal Chemistry in January 2018.



Miguel Thaxter

Programme: MPhil Chemistry
Field of Study: Assessment of the ambient air quality in the Kingston Metropolitan Area, Jamaica
Supervisor: Dr. Michael Coley

I received my BSc degree in Applied Chemistry from the University of the West Indies, Mona. I continued my studies within the Department of Chemistry in 2016 and is currently pursuing a MPhil degree. The research project undertaken focuses on ambient measurements of atmospheric pollutants that contributes to poor air quality in the Kingston Metropolitan.

Ambient pollutant gases and particulate matter with aerodynamic diameter <2.5 µm are monitored using real time air quality sensor monitors. This will allow us to study the behavior of the atmospheric pollutants in much finer details and to explore the exposure of the urban population to air pollution.

The project also involves characterization of the airborne particulate pollutants to determine its sources and the impact of anthropogenic activities on air quality. Air pollution is one of the leading global public health risks but its magnitude and exposure to the urban population in major cities of developing countries such as Jamaica is not adequately known.

The information resulting from this study aims to create or strengthen air quality policies with regards to air pollution in Jamaica.

Poster Presentations:

1. Cariscience Regional Conference. Kingston, Jamaica. 2017. Poster title: Towards the development of an Air Quality Index for Jamaica.
2. Mona Symposium: Natural Products and Synthetic Organic Chemistry. UWI, Mona, 2017. Poster title: Assessment of the Ambient Air Quality in Kingston Jamaica using an Air Quality Index.

Department of Chemistry

Garfield Williams

Programme: PhD in Chemistry
Field of Study: Organic Chemistry
Supervisor: Prof. Paul Reese

I obtained a B.Sc. degree in Pure Chemistry and Biochemistry with First Class Honours from The University of the West Indies, Mona Campus. During that period I was engaged in the Chemistry Peer-led Team Learning programme as a tutor. I have received an academic bursary, postgraduate scholarship and research grants from the said institution. While pursuing my research project I served as Chemistry Association of Postgraduate (CAPS) Secretary, Vice President, President as well as Resident Advisor (Cluster Manager and First Year Experience Facilitator) at Rex Nettleford Hall of residence.

My research project entitled "Transformation of stemodane terpenes and induction of the biosynthesis of natural products in fungi by using epigenetics and media modification" can be described as a synergy between natural products isolation (plant and fungi), semi-synthesis, biotransformation and epigenetics.

The plant *Stemodia maritima* L. produces the compound stemodin in relatively high amounts. Stemodin is reported to possess mild antiviral and cytotoxic activities. As a result of its relative abundance and bioactivity, it has been considered an attractive starting material for preparation of potential biologically active analogues. In this study stemodin was chemically converted to 15 analogues. These were subjected to anticancer, antioxidant, lipid peroxidation and cyclooxygenase 1 and 2 inhibitory assays, as well as biotransformation studies with the fungus *Beauveria bassiana.* The biotransformation study yielded several novel products. Currently, the analyses of these products of biotransformation are being used to generate an active site model of the cytochrome P450 hydroxylase enzyme in this fungus. I am also investigating the induction of secondary metabolite production in fungi, in an effort to discover biologically active compounds.

Nijole Young

Programme: PhD in Chemistry
Field of Study: Analytical/Applied Chemistry
Supervisors: Dr. Michael Coley ; Dr. Anthony Greenaway

The bauxite refining industry is one of the vital pillars of the Jamaican economy and is the third-highest foreign exchange earner for the island. Recent studies have shown that the concentrations of impurities in currently mined bauxites are significantly higher than the concentrations in previously mined ores and this makes the production of high quality alumina much more challenging.

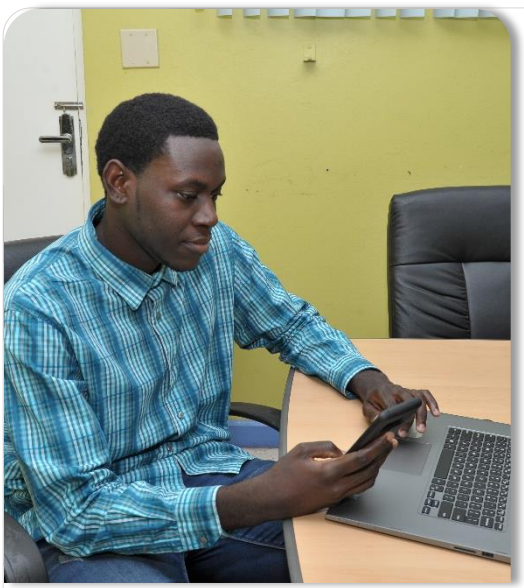
My thesis is entitled "Phosphorus minerals in Jamaican bauxites and red muds - Spectroscopic studies, extractability and control in the low temperature Bayer process". My research involves using a range of instrumental techniques such as powder x-ray diffraction in combination with DIFFRACplus EVA and XDB along with solid state ^{27}Al and ^{31}P MAS NMR to identify the minerals present in selected bauxites and their residues. In addition, bauxites are digested using simulated desilication and low temperature digestion conditions to identify the relationship between phosphorus concentration in bauxites and in the sodium aluminate liquors produced from them. Data from these experiments are being used to devise improved methods of controlling phosphorus impurity in the Bayer process. Another crucial aspect of the research includes the use of multivariate statistics to develop a model to predict extractable phosphorus concentration in Bayer liquors based on the initial bauxite characteristics. The results from my studies will therefore lay the foundation for more effective strategies to be used for impurity control during the processing of Jamaican bauxites.

I end with a quote by my favourite Chemist and these are words that I strive to live by in my daily life:

"Life is not easy for any of us... We must have perseverance and above all confidence in ourselves. We must believe that we are gifted for something and that this thing must be attained." — Marie Curie

The Department of
COMPUTING

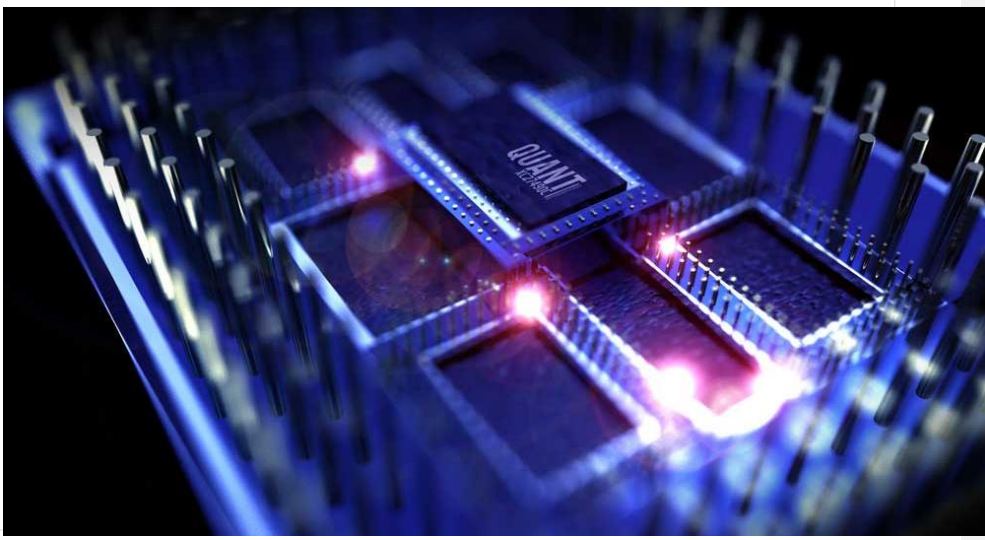
Department of Computing



Dayton J. Allen

Program: MPhil in Computer Science
Field of Study: Machine Learning, Computer Graphics & Vision
Supervisor: Prof. Daniel Coore ; Dr. Paul Gaynor

My current research involves exploring the application of neural networks to the 3D modeling and game asset pipeline in order to provide some level of automation to the process. Some of the assets in this pipeline include 3D characters, textures, animations and audio clips. Contemporary methods of creating these assets are complex and tedious, thus, eliminating or reducing the complexity and tediousness of these approaches would result in a consequential reduction in the amount of effort required to create these assets. The additional resources could then be redirected to other parts of the game development process, such as level design or game engine development or improvement.



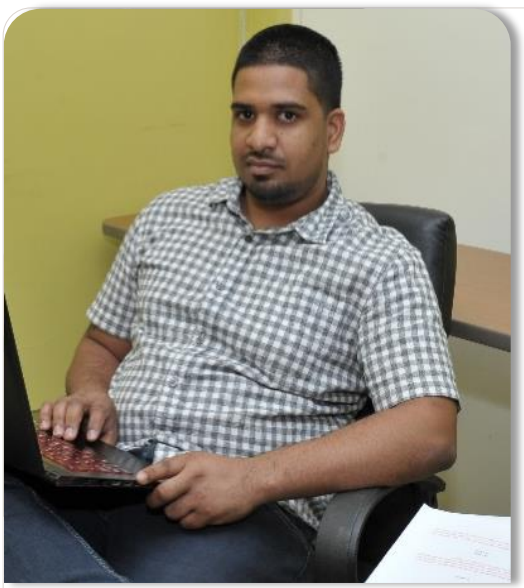
Ricardo Anderson

Programme: PhD in Computer Science
Field of Study: Knowledge Management Systems
Supervisor: Dr. Gunjan Mansingh

I obtained my bachelors and master's degrees in Computer Science and Information Systems respectively from The UWI, Mona. Working with Dr. Gunjan Mansingh, I have pursued research in Knowledge Discovery and Knowledge Management Systems towards developing an integrated process model for transitioning existing information systems to knowledge management systems.

This work has been focused in the developing country context and the process model evaluations done in Education and Social Welfare domains. These case evaluations produced significant contributions to the application of knowledge in real-time fraud detection and improved resource allocation within the domains applied. The results from this work so far have been presented at several international conferences including International Conference on Information System (ICIS), Americas Conference on Information Systems (AMCIS) with extended journal articles published in the International Journal of Business Intelligence Research (IJBIR) and the International Journal of Knowledge Management (IJKM).

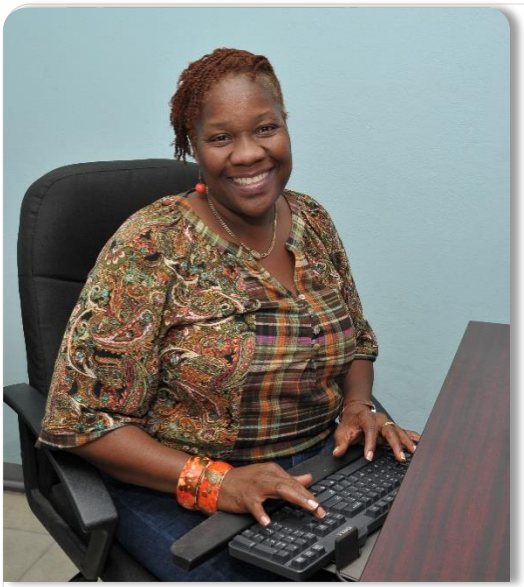
Department of Computing



Seaford Bacchas

Programme: MPhil in Computer Science
Field of Study: Distributed Parallel Application on Big Data
Supervisor: Dr. Simon Ewedafe

After receiving the Bachelor of Science degree in Software Engineering and Psychology from the University of the West Indies, Mona, I commenced my MPhil degree in Computer Science in January 2018. Working with Dr. Simon Ewedafe, we are examining the various methods used to analyze Big Data while adapting the applications of distributed computing to data distribution in parallel, enforcing speed up and efficiency of Big Data analytics. The analysis of Big Data significantly exceeds the computational cost of analyzing regular or normal data sets. Devices all around us today gather data that contributes to the creation of ever growing, dynamic and complex Big Data sets. There is also an increasing demand to analyze this data in real time; hence the growing need for development in innovation and efficiency in the methods used in Big Data analysis. My research therefore attempts to use distributed parallel applications to optimize methods currently in use to analyze data and possibly creating new methods that will revolutionize the factor of efficiency in Big Data analytics.



Nadine Barrett-Maitland

Programme: MPhil in Computer Science
Field of Study: Information Security
Supervisor: Prof. Kweku-Muata A Osei-Bryson
Co-Supervisor: Dr. Gunjan Mansingh

I received a BSc in Computing with Management Studies from the University of Technology, Jamaica. I completed my MSc at the University of the West Indies, Mona at the Mona Institute of Applied Science. I am presently pursuing an MPhil in Computer Science in the Department of Computing where I am hoping to upgrade to the PhD soon.

The topic of my thesis is "Designing a Decision Support System to assist developing countries in building and strengthening their Information Security policies". I am seeking to develop a domain knowledge base that can assist persons in the developing regions in designing and managing information security in their respective regions. Information security is a topical issue and is very important in this digital age, however there is limited information as it related to developing states, and how this new phenomena is affecting these regions. My research will focus on developing a domain knowledge base that can be used to inform the development and strengthening information security policies. I believe my work will have an impact on the society as there is a need for focused attention on information security issues in these regions.

Publications

Security in Social Networking Services: A Value Focused Thinking (VFT) Exploration to Understanding Users' Privacy and Security Concerns Journal IT4D published July 14, 2016.

A Conceptual Model of an Information Security Domain Knowledge Base. Accepted ICIS, December 2015.

Hybrid VFT/ Delphi Method to Facilitate the Development of Information Security Strategies in Developing Countries Accepted Con-IRM, May 2014.

Department of Computing

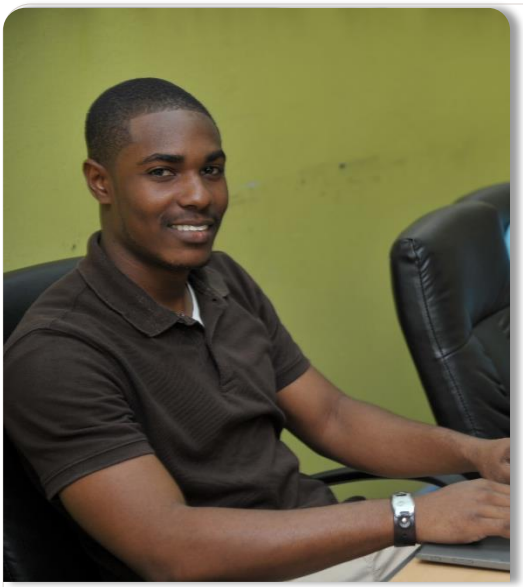
Ainsley Bleary

Programme: MPhil in Computer Science
Field of Study: Algorithm Animation
Supervisor: Dr. Ashley G. Hamilton-Taylor

I received my BSc degree in Electronics and Computer Science and my MSc degree in Computer Science from the University of the West Indies, Mona. My MSc research report title was: "Interactive animation as a mathematics learning aid: an observational study". I have also obtained a Post Graduate Diploma in Education from the University of Technology, Jamaica. I continued my studies within the Faculty of Sciences and Technology in 2016 and am currently pursuing a MPhil degree in Computer Science.

Working with Dr. Ashley Hamilton-Taylor, I am exploring a number of components and features of Algorithm Animation in an effort to identify, define and/or strategically integrate an educational phenomenon observed as students viewed and answered questions related to animations viewed in the computer and society lecture sessions and tutorials. My research topic is: "Exploring relationships of animation components towards future algorigthm animation design: A thematic study" and is aimed at improving student learning outcomes.

Understanding the relational and associative characteristics of the components/features of an algorithm animation could improve educational design for algorithm animation. Hence the data generated from the study would be beneficial to animation instructional media designers as this study enhances the knowledge of animation design development and approaches.



Alton Bodley

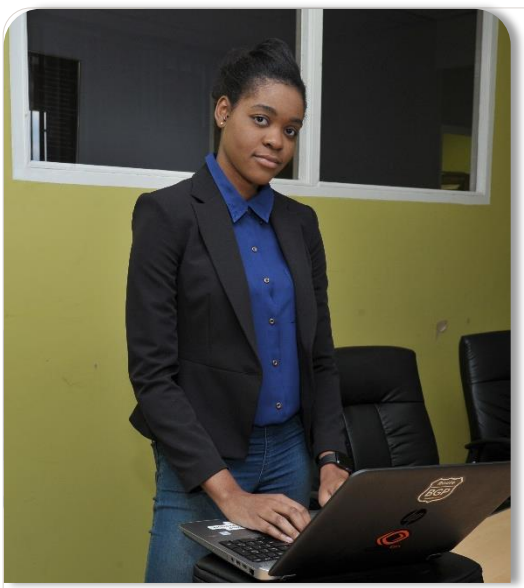
Programme: MPhil in Computer Science
Field of Study: Decision Support Systems
Supervisor: Dr. Gunjan Mansingh
Co-Supervisor: Prof. Kweku-Muata Osei-Bryson

I completed my BSc. Computer Science with First Class Honours in the department of Mathematics and Computing at the University of the West Indies, Mona in 2017. In the same year, I continued my studies in the department in pursuit of an MPhil degree in Computer Science and was awarded the Postgraduate Scholarship. I am a member of the Knowledge Discovery and Management for Development (KDMD) research group headed by my supervisor. Working with Dr. Mansingh and Prof. Osei-Bryson, I am focused on developing a system which will aid the West Indies Selection Board to select a squad of players for a particular tournament based on a range of factors to increase the probability of the squad dominating the tournament.

Cricket is amongst the world's most popular sports; second only to football/soccer, with the One Day International (ODI) being one of the most popular and competitive formats of the sport.

Sports in general is unequivocally a vehicle to economic growth and increasing our regions' performance in one of the world's most popular sporting competitions has the ability to catalyse socio-economic development in our region. Shining the spotlight on our region with a positive hue provides an avenue through which foreign investments can be bolstered and disseminated within and throughout our industries.

Department of Computing



Dominique S. Delahaye

Programme: MPhil in Computer Science
Field of Study: Security within software-defined networks
Supervisor: Dr. Daniel T. Fokum

I received my BSc degree in Computer Science from the University of the West Indies, Mona in 2015. Following a two year hiatus from academics, I registered as an MPhil student with the Department of Computing. My desire to pursue this degree stemmed from being a tutor in 2016 where I worked with my current supervisor, Dr. Daniel Fokum, in delivering the content of several networking courses. After going through the undergraduate system, being an instructor helped to refresh my memory with the course content and helped me to realize that I want to do research in computer networks.

Prior to the beginning of my postgraduate studies, I received two travel grants from the Association for Computing Machinery (ACM) which allowed me to attend SIGCOMM, the ACM's flagship conference on computer networking. Based on the presentations at this conference and discussions with attendees, I became more fully convinced of my desire to focus on software-defined networks. Software-defined networks are a trending topic in Computer Science, as we shift from the typical legacy networks that are occasionally difficult to configure and manage, to centrally managed networks that are also easier to monitor and to scale up. Top companies such as, Google and Microsoft now implement SDNs to cut costs and provide centralized and programmable control of the network.

Despite their success, a major issue with SDNs is the lack of security. My research focuses on securing one portion of the SDN architecture—the east-to-west interfaces. These interfaces are present in software-defined networks that have multiple controllers. My research objective is to create a distributive platform infused with security mechanisms to offer a fully secure solution within the control plane of the SDN architecture. Such a solution would not only attract enterprises that already implement SDNs, but also attract new consumers.

Anthony Drummonds

Programme: MPhil in Computer Science
Field of Study: Cyber Security
Supervisor: Dr. Daniel T. Fokum

As a proud achiever and holder of a BSc in Computer Science and Electronics degree, and a MSc in Computer Science degree, both from the University of the West Indies, Mona, I sought the need to apply my skills and expertise to the field of research. I then established myself in the MPhil in Computer Science programme where I currently conduct research in the Cyber Security field with my supervisor, Dr. Daniel T. Fokum.

My research involves the use of ontology models and mobile agents towards the reduction of malware activity in the Internet of Things. The Internet of Things is a growing concept where all devices will eventually be connected to the internet, share information between each other and make intelligent decisions. Malware attacks have been an increasing threat to the Internet of Things and causes numerous damages to many companies and organizations. Damages include data loss, identity theft, hardware failure and denial of service. To combat these issues, I use ontology models for effective knowledge modelling to study, predict and intercept malware activity, along with mobile agents which are light-weight computer software and has the ability to move between hosts on a network. The ontology models have already been developed and the mobile agent network development is currently in progress. Once that is complete, testing with malware will begin.

The title of the research is: "A Collaborative Network of Ontology-Based Mobile Agents for Mitigating Malware Attacks in the Internet of Things". My research will introduce the design and implementation of new security protocols and mechanisms towards preventing malware attacks from which many companies, organizations and individuals will benefit.

Department of Computing

Ilenius Korongo Ildephonce

Programme: MPhil. in Computer science
Field of Study: Serious game analysis and design
Supervisor: Dr. Ezra Mugisa
Co-Supervisor: Dr. Claudine Allen

In 2013, I received a BSc. degree in Information Systems at the University of Dodoma, Tanzania. My passion to become a scholar pushed me to join the University of West Indies, Mona in September 2014 to pursue a Master of Philosophy degree in Computer Science. I am passionate about achieving positive behaviour change through play, especially the use of serious games and gamification products.

I am working with Dr. Ezra Mugisa together with Dr. Claudine Allen. I am researching on "Effective serious game development using learning objects". These sort of games combine high fidelity audio and video content with experiential, social, or exploratory pedagogy and also often incorporate multiple learning objectives. Using games, we learn and apply basic concepts simultaneously. It is important that we define effective methods for the design in order to utilize to the maximum, the benefits that these media can offer in teaching and learning.

My research entails analysis and design of effective, and meaningful serious games. We have developed frameworks that define this version of gaming. We have also tested the frameworks by designing and implementing a prototype called "NetCom Quest". Currently, we are ascertaining the requirements for this type of gaming with the intention of launching a platform that meets its standards and our objectives.

Sean Miller

Programme: MPhil in Computer Science
Field of Study: Computer Science
Supervisor: Dr. Curtis Busby-Earle

After completing my BSc in Computer Science at the University of the West Indies, I continued my studies in the Department of Computing in 2015 working with Dr. Curtis Busby-Earle on Machine Learning and Cybersecurity. As machine learning methods advance and algorithms become more effective at solving different problems, we see ML being applied to varying fields. Most, if not all, real-world problems are multifaceted by nature and require solutions that are able to deal with this characteristic. As machine learning methods evolve they become increasingly more effective at prediction based on data.

Our work focuses on not only accurate predictions but giving systems the ability to explain their predictions. We have published four papers including one that specifies the model we created. The aim is to apply this model to other fields, to provide insights based not only on predictions but understating those predictions.

Department of Computing

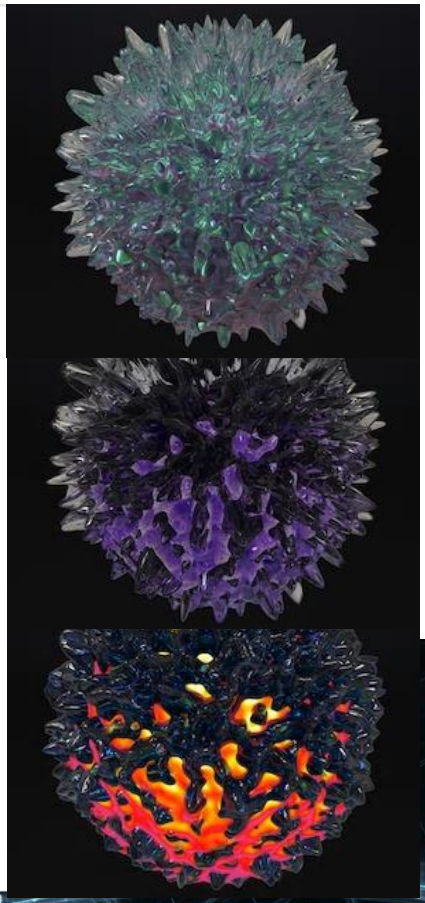
Keniel Romario Peart

Programme: MPhil in Computer Science
Field of Study: Amorphous Computing
Supervisor: Prof. Daniel Coore

I received my BSc degree in Computer Science from the University of the West Indies, Mona. I continued my studies within the Department of Computing in 2017 and is currently pursuing a MPhil degree in Computer Science.

Working with Prof. Daniel Coore, I am exploring the field of amorphous computing, specifically how biological processes such as Alan Turing's theory on Reaction Diffusion Systems can inspire techniques and environments that give rise to emergence.

Amorphous Systems usually require limited memory and computational abilities which can reduce cost value but still give rise to unique emergent behaviours.



The Department of GEOGRAPHY AND GEOLOGY

Department of Geography and Geology

Romario Anderson

Programme: MPhil in Geography
Field of Study: Palaeoecology
Supervisor: Dr. Michael Burn

I received my BSc degree in Geography from the University of the West Indies, Mona. I continued my studies within the Department of Geography in 2017 where I am currently pursuing a MPhil degree in Geography with my areas of interest encompassing Biogeography, Palaeoecology and Climate Science. Working with Dr. Michael Burn, I intend to reconstruct fire and vegetation histories of a section of dry limestone forest located in the Hellshire Hills by analyzing fossil charcoal and pollen particulates recovered from sediment cores from the Salt Island Lagoon with the use of a Colinvaux/Vohnout piston corer. The charcoal and pollen proxies when used together enable an understanding of fire regime conditions such as fire frequencies, magnitude, severity along with environmental conditions such as changing climate and vegetation allowing for the relationships they share within a landscape to be explored. Research of this nature is especially important as forests are at increased risk of fires and environmental degradation in the 21st century with increases in the intensity, area, frequency and duration of these fire events and seasons expected. This problem is heightened by the fact that forest fires increase the likelihood of subsequent combustion especially if the death of trees enables the infestation of flammable grasses. It is also well known that forest fires produce significant effects on forest ecosystems such as a slow biomass, nutrient and diversity recovery (oftentimes over a decade), arrested succession and vegetative shifts. Gaining an understanding of these dynamic processes occurring within these forest ecosystems will provide valuable information on how and why certain species of plants disappear along with changes in forest fire regimes over time which will help to implement effective anticipatory management practices for dry limestone forests, the most disturbed and least protected on earth.

Sarah Buckland

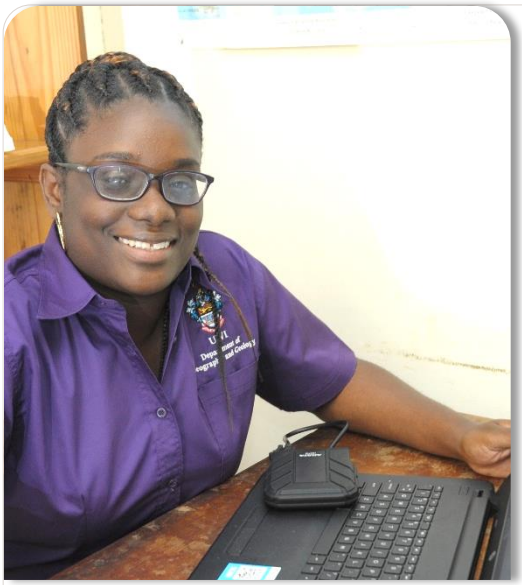
Programme: PhD in Geography
Field of Study: Drought and agriculture in Jamaica
Supervisor(s): Dr. Donovan Campbell

I completed my BSc degree in Geography (Major) and Spanish (Minor) with first class honours. I am presently a PhD Candidate in the Department of Geography and Geology, UWI Mona where my research assesses the resilience of crop production systems to drought in Clarendon, Jamaica. This research comes at the heels of the 2014/15 drought event, one of the most devastating droughts in Jamaica's recent history. The area of focus, Clarendon, is one of Jamaica's most intensive and expanding agricultural regions. My research combines bio-physical and socio-economic factors, probing variations in drought exposure, sensitivity and farmer adaptive capacity through 25-year analyses of historical rainfall (1992-2016), historical crop production, and remote-sensing of vegetation changes. The research also integrates extensive farm-level feedback through social surveys (N≈423) supported by the UWI Research and Publications Grant, and the Geography Department.

My research offers potential practical contributions to enhance anticipatory planning and decision-making at the farm and policy-levels. Some of the most pertinent factors and locales of vulnerability are highlighted, which may aid in targeted and efficient resource allocation for future drought adaptation projects. Seasons with the highest drought probabilities are underscored, with potential implications for the sustainability of traditional cropping calendars. Farm-level feedback also sheds light on refining future climate service communication and delivery. The research also probes best practices for cost-effective drought mitigation among local farmers, which can serve as a basis for improving local extension services.

Aspects of my research have been presented at various UWI Research Days, Department Seminars and ACDI/VOCA World Meteorological Day (2016). Motivated by faith in God, family support and a zeal to positively influence society, aspects of my academic work have also received recognition through the CCRIF-UWI Scholarship (2014-2015), UWI Postgraduate Scholarship and the Prime Minister's National Youth Award for Excellence in Academics (2017).

Department of Geography and Geology



Melissa M. Curtis

Programme: MPhil in Geology
Field of Study: Water Resources and Hydrology
Supervisor: Dr. Arpita Mandal

I received my Bachelor of Science in Geology with a minor in Geography in July 2015. I continued further studies in the Department of Geography and Geology pursuing an MPhil in Geology with specialization in Hydrology and Water Resources.

Working with my supervisor Dr. Arpita Mandal, my research focuses on the Hydrological Assessment of the Rio Cobre Basin in St. Catherine using the Water Evaluation and Planning (WEAP) model. My interests include Water Resources, Hydrological modelling and Integrated Water Resource Management (IWRM). Climate change has significantly impacted the water resources of Jamaica over the last decade.

With an Integrated Water Resource Management approach, future predictions for water availability can be made for different climate scenarios. Over the last decade, there has been an increasing demand for potable water supply in the Kingston Basin which has been drought-stricken in the last four to five years. The Yallahs and Hope River, the main contributors to the Kingston Basin's water resources, were also affected by drought conditions so the need has arisen to seek alternate sources of water for the Kingston Basin. The Rio Cobre Basin, located to the west of the Kingston basin, can be used as a possible source with an in-depth assessment of the demand, supply and water resources. Based on the analysis considerations can be made to export water to the Kingston Basin in drought conditions.

With the guidance of my supervisor Dr. Arpita Mandal, I presented at the Geological Society of America (GSA) conference in Seattle in 2015.

Kristinia Doughorty

Programme: MPhil in Geography
Field of Study: Land degradation in agroecosystems of Grenada and Dominica
Supervisor(s): Dr. David Miller

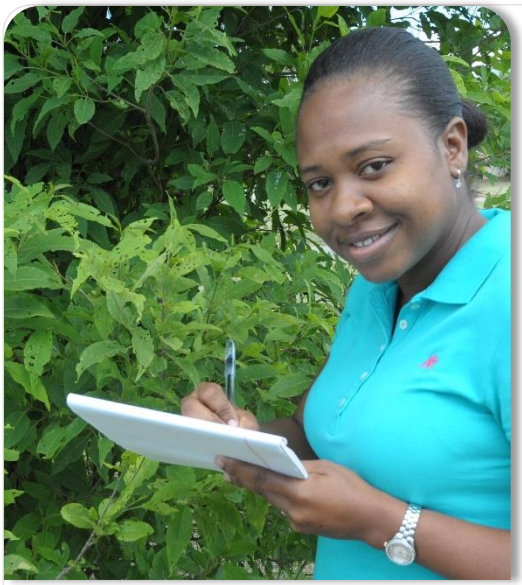
I received my BSc degree in Geography with a minor in Geology from the University of the West Indies, Mona. I continued my studies within the Department of Geography in 2017 and is currently pursuing an MPhil degree in Geography. My research interests include land degradation, sustainable land management and vulnerability to climate related hazards.

Working with Dr. Miller, I am using a mixed methods approach to assessing the state of land degradation within agroecosystems of Grenada and Dominica. The methodology of the paper will follow the DPSIR framework analyzing biophysical, ecological and socio-economic aspects of land degradation. It will analyse the relationship between the state of land resources, pressures on the land resources, driving resources, impacts on ecosystem services and human livelihoods and possible responses from key stakeholders.

Small Island Developing States (SIDs) such as Grenada and Dominica are more vulnerable to land degradation as a result of the impacts of climate change as well as limited natural resources. Land degradation within Grenada and Dominica have been noted by their respective governments but have not been well researched or documented by academics. Land degradation within agroecosystems may result in reduced crop yield, soil erosion, sedimentation of streams and desertification.

This paper will, therefore, highlight the current state of agroecosystems within Grenada and Dominica as well as, if necessary, possible solutions to the issues affecting the agroecosystem's sustainability. It will also show how the different climatic conditions, cropping systems along with agricultural practices affect the sustainability of agroecosystems.

Department of Geography and Geology



Nathalie Ennis-Palmer

Programme:	MPhil in Geography
Field of Study:	Land Management and Protected Areas
Supervisor:	Dr. Donovan Campbell

Nathalie Ennis-Palmer is a MPhil candidate in the Department of Geography and Geology whose research focuses on the socio-ecological resilience of farming communities around the Blue and John Crow Mountains National Park. Protected Area according to the Convention on Biological Diversity is "a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives". The Blue and John Crow Mountains is the first National Park established in Jamaica for ecosystem protection and recreation. The communities surrounding the park depend on ecosystem services for their survival; however poor agricultural practices is one of the major factors contributing to the degradation of ecosystems. Despite numerous interventions the problem still persists. Both agriculture and the ecosystem need to be resilient, being able to withstand some amount of disturbance and is still able to function and not entirely shift into an alternate state. Her research therefore seeks to provide an understanding of the nature and dynamics of farming communities around the Blue and John Crow Mountains Protected Area. The changes between 1985 and 2016 in land cover and land use is also being explored using remote sensing technique. In an effort to address well-being and level of resilience, the determinants of socio-ecological resilience are being assessed using guidelines from Resilience Alliance. The results are expected to identify entry points for policy interventions geared towards enhancing livelihoods and ecosystem resilience in rural communities.

Peta-Gay Harris

Programme:	MPhil in Geology
Field of Study:	Water Resources Management
Supervisor:	Dr. Arpita Mandal, Department of Geography and Geology
Co-Supervisor:	Dr Debbie Ann Gordon Smith, Department of Chemistry

My main career goal is to specialize in hydrology and hydrogeology, and vulnerability assessments of urban centers to improve water security amongst Small Island Developing States.

Since the 1980s, the quality of groundwater resources in Jamaica has deteriorated especially within urban areas of Kingston and St. Andrew due to rapid urbanization coupled with improper sewage disposal and treatment as well as lack of adequate management of the available water resources. The purpose of my research is to determine the relationship between urban population growth in the Kingston hydrological basin and the concentration of anthropogenic contaminants and their modelled pathway through the sub-surface rock-soil layers thus covering both the alluvial and limestone aquifers.

The project will also look at the isotopic composition of the groundwaters, focusing on the stable isotopes of Oxygen, Hydrogen and Deuterium and their role in recharge calculations. It will also aim to separate the Nitrogen isotopes in the groundwaters which will aid in determining the source of the nitrogen (such as from sewage vs agricultural).

Effective recharge calculations from isotope data coupled with model calculations will aim in estimating the resources, current and future water budget and thus aid in planning and management. It will also increase our current knowledge of contaminant levels/transport and act as an auxiliary tool for identifying suitable wells for specific uses. Water is essential for our daily activities therefore, it is imperative that Jamaica sustainably manage and protect the quality of this resource.

Department of Geography and Geology

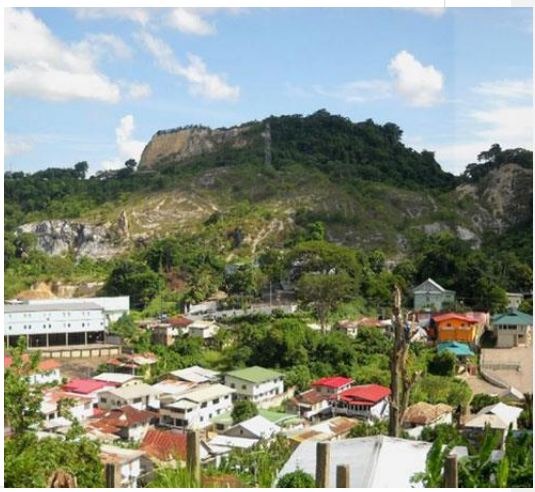
Aleem Ibrahim Mahabir

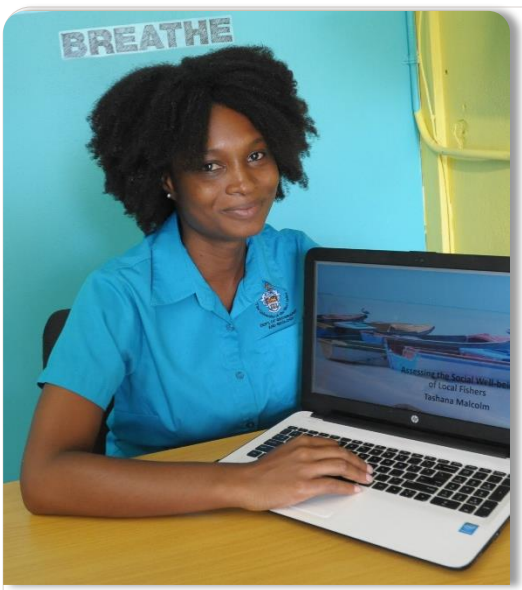
Programme: MPhil in Geography
Field of Study: Socio-Spatial Exclusion in Trinidad and Tobago
Supervisor: Dr. Robert Kinlocke

I successfully graduated with a BSc in Geography (First Class Honours) from the University of the West Indies, Mona. That same year, I began pursuing an MPhil in Geography at the Department of Geography and Geology. Under the supervision of Dr. Robert Kinlocke, my research attempts to extend the conceptual and practical dimensions of behavioural and psychosocial geography within an urban context.

Utilizing a multi-dimensional approach to the study of social exclusion, I aim to examine both the underlying psychosocial drivers, and the structural mechanisms that have perpetuated enduring socio-spatial exclusion and marginalization amongst residents living in the fortified enclaves in San Fernando and Port of Spain, Trinidad. Additionally, I will explore the role of innovation and human agency in the management of marginalization and extend understandings of how a 'geography of hope' can be incorporated into existing frameworks which attempt to curtail marginalization.

The innovative blending of methodologies in this study will provide critical insight into possible ways in which structural factors shape psychosocial outcomes and neighbourhood character. It will also aid in extending academic discourse on urban enclaves in the Caribbean by examining the experiences of the poor in underrepresented spaces.





Tashana Malcolm

Programme: MPhil in Geography
Field of Study: Fisheries Livelihood and Protected Area Management
Supervisors: Dr. Donovan Campbell and Professor David Barker

A PhD candidate in Department of Geography and Geology, my research focuses on the social dimensions of Marine Protected Areas (MPAs) in Jamaica. The decline of Marine biodiversity in Jamaica has prompted the Government to establish a network of Special Fisheries Conservation Areas (SFCAs) across the Island. While the ecological benefits of SFCAs are well established, there is a paucity of research on its social dimensions in Jamaica and the wider Caribbean.

The research is motivated by the socioeconomic and theoretical concerns related to MPAs in Jamaica. Economically, the SFCAs are expected to improve livelihood conditions of fishers by encouraging and supporting alternative income-generating activities. There is, however, limited understanding of the impacts of SFCAs on the wellbeing and livelihoods of fishers. Theoretically, the research is the first attempt to quantify the wellbeing of fishers in the Caribbean.

It is anticipated that the research will add to the growing body of literature that takes a wellbeing approach to fisheries. It will also provide a greater understanding of the livelihood opportunities and challenges associated with SFCAs across the island.

Preliminary findings from the research have been presented at the 67th Gulf and Caribbean Fisheries Institute conference in Barbados, the 69th South Eastern Division of the Association of American Geographers conference in Athens Georgia and the UWI Geography 50th anniversary conference.

Funding for this study was obtained through the Office of Graduate Studies and Research, University of the West Indies, Mona.

Department of Geography and Geology

Natalie Robinson

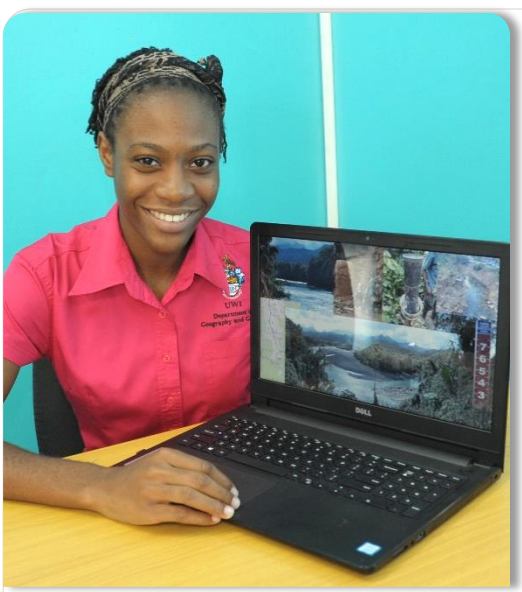
Programme: PhD in Geology
Field of Study: Sedimentology and Micropalaeontology
Supervisor: Prof. Simon Mitchell

After receiving my BSc degree in Geology in 2014, I continued my studies within the Department of Geography and Geology to pursue my PhD in Geology. Working with Professor Mitchell, I will be seeking to unveil the past ecological characteristics of Jamaica's carbonate platform towards the end of the Eocene. During the Paleogene the Nicaragua Rise saw the development of extensive carbonate platforms that today are only exposed at surface in Jamaica. However, faults associated with the tectonic uplift of Jamaica have largely obliterated the original platform margins with shallow-water deposits faulted against deep-water deposits. This research will be reporting on an Eocene platform margin that is preserved on the northern part of the largest platform that has developed in central Jamaica.

The platform margin is represented by extensive carbonate sand banks (foraminiferal grainstones and packstones) dominated by foraminifers and algal oncoids. The foraminiferal assemblages are characterized by typical Eocene shelf margin taxa. The occurrence of some of these larger foraminifera in Jamaica is documented and described. The stratigraphic distribution is then shown and the link between their evolution and the change in environment on the carbonate platform is investigated. This research seeks to understand Jamaica's carbonate depositional system as well as bringing to light a more numeric geological stratigraphy for the Eocene.

Presentations

1. The Faculty of Science and Technology Conference (Jamaica-April 2015)
2. The Geological Society of Jamaica 60th Anniversary Conference (Jamaica-Nov. 2015)
3. The Geological Society of America Conference (Colorado-Sept. 2016)
4. The Micropalaeontological Society Annual Meeting (London-Nov. 2017)



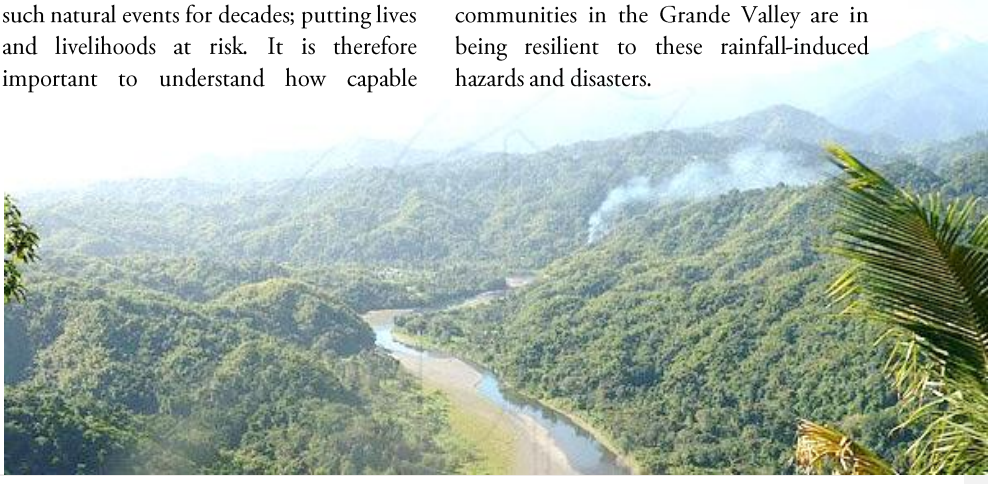
Shaughna-Lee Steele

Programme: MPhil in Geography
Field of Study: Disaster Resilience
Supervisor: Dr. Donovan Campbell

Having obtained my BSc. Degree in Geography at the University of the West Indies Mona, I moved on to pursuing my MPhil degree in Geography in the Department of Geography and Geology. My research is focused on assessing the resilience of communities in the Rio Grande Valley, Portland, to rainfall-induced hazards and disasters (eg. flooding and landslide).

The Rio Grande Valley has been plagued by such natural events for decades; putting lives and livelihoods at risk. It is therefore important to understand how capable communities are of coping with, responding to and recovering from these natural events - being resilient. In order to gain insight into this matter, a Resilience Index will be developed drawing on variables related to Disaster Risk Reduction, livelihoods sustainability and social development.

The findings from this research will lead to the identification of strengths and weaknesses, which will subsequently paint a clearer picture of the stage at which communities in the Grande Valley are in being resilient to these rainfall-induced hazards and disasters.



Department of Geography and Geology

Jhannel Tomlinson

Programme: PhD Geography
Field of Study: Climate Change Adaptation
Supervisor: Dr. Donovan Campbell

As a PhD candidate in the Department of Geography and Geology, my research is focused on climate change adaptation in agricultural communities. Specifically, the research incorporates the use of the Natural Resource Management (NRM) Group Evolution Framework in tandem with the Community Based Resilience Analysis (COBRA) methodology, to assess the capacity of Community-based Organizations (CBOs) to effectively support current and future climate change adaptation initiatives.

Across the Caribbean there is a paucity of methodological and normative information on effective climate change adaptation approaches that contribute effectively to sustainable development and human wellbeing. Development agencies have led the implementation of such initiatives using Community-based Adaptation (CBA) approaches, which have emerged as instrumental in developing the capacities of communities to various risks and in adapting to the changing environmental conditions.

Agriculture CBOs in particular, are crucial in helping farmers to co-ordinate activities and facilitate the management of natural resources in a sustainable manner. The sustainability of CBA initiatives is therefore determined by the strength of these community groups - especially in rural farming communities where these organizations further serve as avenues for soliciting support for adaptation in the form of monetary resources, information and capacity building.

Despite their recognizable importance, there is a limited understanding of the status and capacity of these agricultural groups to effectively participate in the sustainability of adaptation programs. This research will contribute to an understanding of the factors that influence the sustainability and capacity of Agriculture Community-based Organizations to advance adaptation strategies.

Shavel Watson

Programme: MPhil in Geology
Field of Study: Engineering Geology
Supervisor: Prof. Simon Mitchell

Upon receiving my B.Sc. degree in Geology, in 2016, I continued my educational journey by pursuing a MPhil degree in Geology, with an emphasis on carbonates (limestone and dolostone). My research seeks to shed light on the specific Geotechnical Properties of the White Limestone Group of Jamaica found on sections of the Clarendon Block, under the supervision of Professor Simon Mitchell.

Limestone is found in copious quantities within Jamaica, representing the most abundant rock type. Though these were the topic of detailed geological investigations, little work has been done specifically on their geotechnical properties.

The focus of this investigation is on their mechanical, physical and chemical properties. Due to the accessibility of limestone worldwide, this research represents a contribution to the knowledge of the engineering geological properties of such a rock types and could be taken into account as a reference for the laboratory characterization of similar rocks.

The Department of
LIFE SCIENCES

Department of Life Sciences

Randy Aird

Programme: MPhil in Environmental Biology
Field of Study: Soil Carbon
Supervisor: Dr. Jane Cohen

My research involves assessing soil carbon stocks in different Jamaican forest cover. In working with Dr. Cohen, I plan to utilize direct and indirect methodologies to assess the soil organic carbon content.

Excess carbon, in the form of carbon dioxide in the atmospheric pool, has led to the warming effect that has produced changes to Earth's climate. Forests are a natural means of channelling carbon from the atmospheric pool to the soil pool through organic compounds. These compounds when deposited into the soil are known as soil organic carbon and this process is known as carbon sequestration.

Data garnered from this project will provide information on the amount of soil organic carbon present in the different forest covers. This can help to influence the country's conservation and land-use policies and further strengthen the efforts of reforestation.

Taneisha Barrett

Programme: MPhil in Zoology
Field of study: Forensic Entomology
Supervisor: Dr. Eric Garraway

I completed my undergraduate studies at the University of the West Indies (UWI), Mona in 2011 graduating with a Bachelor of Science (BSc.) in Biochemistry and Zoology. Following my undergraduate years, I worked as a Laboratory Assistant (demonstrator) in the Departments of Biochemistry and Life Sciences.

My interest for scientific research was renewed when I was introduced to the field of Forensic Entomology by Dr. Garraway in 2013. Forensic Entomology is the use of insects and their arthropod relatives in legal matters. It is a new area of research in Jamaica and therefore one of the aims of the research is to create a database to supply useful information.

I have been conducting development and morphological studies on Dipteran larvae which belong to the family Calliphoridae; this group is known to colonize corpses as soon as a few minutes following death and therefore serve as primary and the most accurate forensic indicators. To date, data has been obtained on all three larval instars of four species of Calliphorids which could potentially serve as forensic indicators in Jamaica. It has been observed that these flies colonize carrion and lay eggs in a particular sequence and develop at varying rates. Important to note is the fact that one of these species (an early colonizer) is endemic to Jamaica and there is very little information on its immature stages.

Since development takes a known time, once there is adequate information on duration of life cycle stages and morphology of the immature stages is known, insect evidence can be applied in legal matters- specifically in medico-criminal investigations- to give the best estimate of time since death.

Department of Life Sciences

Tremaine S. Bowman

Programme: MPhil in Zoology
Field of Study: Freshwater Ecology
Supervisor: Dr. Eric Hyslop

I completed my BSc. in Marine Biology July 2017 and began my MPhil in September 2017.

There is opportunity for research around every corner in Jamaica. Salt River, as the name suggests, is a saline lotic system located in Clarendon Jamaica. Despite being a river, the fishes which inhabit the waters are predominantly marine in origin. The salinity of Salt River is double that of the expected salinity range for most Jamaican rivers and the upper part of the area is fed by a mineral spring.

This ecosystem is unique, and so, in conjunction with my supervisor, we decided to assess the composition and biology of the fishes that inhabit the river. Additionally, we aim to map the distribution of fishes along the length of the channel, comparing the catch at different sample sites. Study of the diet of the component species in conjunction with mapping will yield information about the extent of resource partitioning and the structure of the fish community.

At present, monthly fish samples are being collected from 3 sites on the river by seine netting. Physico-chemical parameters, in particular, conductivity, are also being measured.

This project will contribute to the body of science relating to Jamaican fisheries and fish population and diet studies. There is at present no documented information on the fish community of Salt River. Salt River and the associated wetlands would appear to form important "nursery grounds" for a number of commercially important marine species. As such, a better understanding of the location and the fish community it supports can feed into management decisions relating to commercially important fish stocks in the surrounding area. One of the main objectives of this study is to rectify this situation by establishing which fish species are found in the river and by mapping their distribution from source to mouth.

Marco-Dean Brown

Programme: MPhil in Zoology
Field of study: Parasite Epidemiology
Supervisor: Prof. Ralph Robinson
Co-Supervisor: Prof. John Lindo

My curiosity to delve deeper and unearth insight of life forms in my surroundings resulted in my studies and completion of a Bachelor of Science Degree in Experimental Biology (Double Major). During my study, I was introduced to parasitology and immunology and decided to marry both fields to study the molecular epidemiology of *Angiostrongylus cantonensis.*

A. cantonensis is a food-borne zoonotic pathogen that is the most important aetiological agent of eosinophilic meningitis worldwide. The nematode is commonly transmitted between rodents and molluscs. Humans become infected through the ingestion of molluscs or vegetable material contaminated with the infective stage of the parasite.

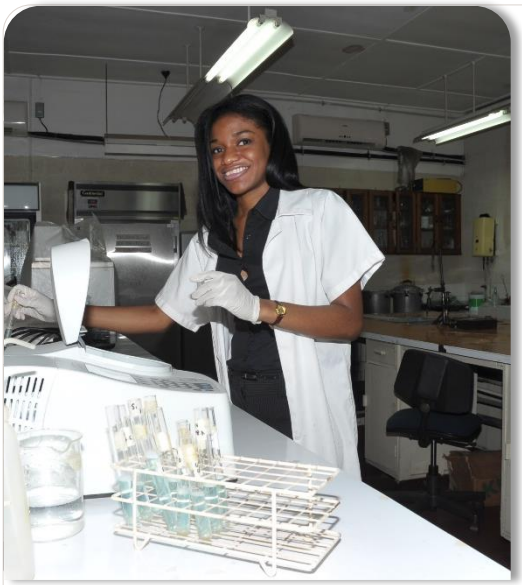
I am currently extracting the genetic material of the parasite from peri-domestic terrestrial molluscs in North Eastern Jamaica to identify the most important intermediate host(s) of the parasite. The genetic material of *A. cantonensis* will subsequently be sequenced and compared to previous studies on the phylogeography and genetic variation of the nematode to map the locality/localities from which the parasite was introduced to Jamaica.

It is my intention to also examine paratenic hosts of the parasite to investigate their impact, if any, on the local epidemiology.

There is also a global concern regarding cases of *A. cantonensis* induced meningitis that may have been misdiagnosed as viral, bacterial or fungal meningitis. Polymerase Chain Reaction coupled with Gel Electrophoresis will be used to detect the genetic material of the parasite in cerebrospinal fluid of patients with elevated levels of eosinophil and are suspected to have meningitis.

I have presented at the International Conference in Parasitology, Bangkok (2017) on my work and other local studies. I was also a speaker at the University of Technology, Faculty of Science and Sports 4th International Scientific Conference and was awarded most outstanding student scientist (2016).

Department of Life Sciences



Chantelle Campbell

Programme: MPhil in Botany
Field of Study: Crop Science
Supervisor: Prof. Paula Tennant
Co-Supervisor: Prof. Noureddine Benekeblia

In the year 2013, I graduated from the University of the West Indies with a Bachelor's of Science degree in Tropical Horticulture (Honours). Presently, I am pursuing a Master of Philosophy (MPhil) degree in Botany with my thesis titled 'Changes in the Physiology and Biochemistry of Naseberry (*Manilkara zapota* van Royen cv. Alano) Fruit During Ripening'.

Having been a member of the American Society of Agronomy, Crop Science Society of America and Soil Science Society of America, I presented at the Annual General Meeting (2015) in Minneapolis, titled *'Synergy in Science: Partnering for Solutions'* on the 'Biochemical Variations of Tannins and Total Reducing Sugars during Three Ripening Stages of Naseberry'.

My interests and concern for Jamaica's agricultural development led me to the field of Crop Science. Many of our tropical fruits have great market potential and value, some of which are being under-utilized such as the naseberry. Native to Central America, the fruit has grown very popular on a global and commercial scale –producing numerous cultivars, 10 of which are grown in Jamaica. The characteristic rich latex of the tree contributes to the fruit's biochemical properties and unique taste and texture – from being very hard, astringent and gummy to soft and very sweet when ripe. The fruit seems to be climacteric but difficult to determine when it is ready to harvest. By understanding the physiological properties and biochemical content of naseberry, the maturity and ripening processes of the fruit can be better understood and well determined.

Gavin Campbell

Programme: MPhil in Environmental Biology
Field of Study: Cave Fauna
Supervisor: Dr. Eric Hyslop
Co-Supervisor: Dr. Eric Garraway

Being interested in research long before starting my undergraduate degree, my intrinsic motivation led me to complete my B.Sc. in Environmental Biology at the top of my class as valedictorian for Science and Technology in 2016.

Pursing an M.Phil in Environmental Biology, I have completed my first graduate seminar and received a research and publication grant from the University of the West Indies. My graduate research focuses primarily on the fauna found within Jamaican caves and their ecology. As little systematic work has been done in the field for several decades, the research is essential for understanding the cave environment and the connected environmental and economic services.

My research will primarily assess invertebrate fauna in the Hellshire Hills, Green Grotto and Jackson's Bay; highlight the species found in caves throughout Jamaica and how they affect the physical subterranean and epigean environments. The activities of the fauna have a great impact on the quality of rivers and forests. This research will improve understanding of the natural resources, increasing productivity of economic activities including fishing, farming, forestry, rafting and water for domestic and industrial uses.

As a testament to my interest in Life Sciences, I have also started a second project on the Biology of Temporary Waters. This research focuses on the invertebrate fauna of temporary bodies of water and will have important implications for climate change in the future of Jamaica.

Department of Life Sciences

Keron C. St. E. Campbell

Programme: PhD in Botany
Field of Study: Taxonomy, Systematics & Conservation
Supervisor: Dr. Philip Rose

I am a graduate of the University of the West Indies, Mona where I successfully completed my Bachelor's and Master's degrees in Botany and Natural Resource Management (Tropical Ecosystem Assessment and Management) respectively. I am employed full-time as the Botanist at the Natural History Museum of Jamaica, a division of the Institute of Jamaica.

The research I am involved in is focused on the family Asteraceae (Sunflower Family). Initially I was awarded a grant by the Mohamed bin Zayed Species Conservation Fund to conduct research on *Acanthodesmos distichus* and *Acanthodesmos gibarensis* which are both considered critically endangered species endemic to Jamaica and Cuba, respectively. This research mushroomed into a broader scope to now involve investigations on other Asteraceae species and in particular members of the tribe Vernonieae which have been problematic in understanding with respect to their phylogenetic placement and relationships within the tribe.

I have been awarded a grant from the Graduate Studies and Research Fund which will be used to procure equipment and conduct fieldwork commencing in semester two of the 2017/18 academic year.

The research will help us to better understand the relationships between the species within this tribe taking into consideration local and regional species. It will also allow for recommendations on the conservation measures to be undertaken for these species and, in extension, outline a framework that can be used to assess other rare or endemic species. In so doing, I hope to contribute to our national and regional obligations under the Convention of Biological Diversity among other international agreements.

Denise Chin

Programme: PhD in Marine Sciences
Field of Study: The biology and ecology of Lionfish in Discovery Bay, St. Ann, Jamaica.
Supervisors: Dr. Karl Aiken and Dr. Dayne Buddo

I have a Bachelor of Science in Environmental Biology and a Master of Philosophy in Marine Sciences at the University of the West Indies, Mona. I am a recipient of the UWI Postgraduate Scholarship and is currently pursuing a Doctor of Philosophy in Marine Sciences focusing on marine invasive species, in particular the lionfish invasion in Jamaica. I have received grants from the UWI Research and Publications Awards. Partial funding for this project was from the Mitigating the Threats of Invasive Alien Species (IAS) in the Insular Caribbean.

Lionfish (*Pterois volitans* and *Pterois miles*) are marine invasive species that have been established since 2008 in Jamaica's coastal waters including the Pedro Bank. They are native to the Indo-Pacific Region. The low numbers of natural predators in Jamaican waters due to overfishing suggests that lionfish could be a potentially significant threat to Jamaica's biodiversity and the marine ecosystem.

This research aims to investigate the biology and ecology of this invasive marine fish in Discovery Bay, St. Ann on the north coast of Jamaica. The following components of the research are being investigated:

1. Population dynamics of the lionfish in Discovery Bay, Jamaica
2. Feeding ecology of the lionfish in Discovery Bay, Jamaica
3. Biology and ecology of the lionfish including ageing
4. An assessment of a passive capture mechanism for lionfish
5. A rapid assessment of economic and social impacts of the lionfish invasion in Jamaica.

Preliminary results are indicating that lionfish are declining at ≤18.3 meters (60') along the Discovery Bay coastline which may be attributed to increased public education and awareness such as the national "Let's Eat It to Beat It" campaign and training about lionfish and its impacts. Active and passive fishing of lionfish also assist in the reduction observed.

The research has shown that lionfish are generalist feeders consuming small adult and juvenile fishes, crustaceans and mollusc which are both economically and ecologically important. Further aspects of the study will assist with management and policy formulation on a national and regional scope.

Department of Life Sciences

Dexter-Dean S. Colquhoun

Program:	PhD in Marine Sciences
Field of Study:	Jamaican Fisheries
Supervisors:	Prof. Mona Webber, Prof. Dale Webber

I recently matriculated into my PhD program (September 2017) after successfully upgrading my MPhil research entitled: 'Plankton and water quality assessment of San San Bay and the Blue Lagoon to the Turtle Crawle areas of Portland Jamaica, towards the creation of a Special Fishery Conservation Area (SFCA) in east Portland, Jamaica'.

This study provided useful baseline data regarding the composition and distribution of the zooplankton species, phytoplankton biomass (as size-fractionated chlorophyll a), as well as physicochemical parameters (including nutrient content) of the coastal waters in east Portland. This work supported and eventually contributed to the designation of a 6 km^2 area in east Portland as the parish's first SFCA (July, 2016).

My current research includes using computer software to model key functional groups of the planktonic community in east Portland; and further to explore the potential effects of various scenarios (e.g. nutrient loading, climate change) on the newly declared SFCA.

These kinds of extrapolations involving the planktonic community are important primarily as i) plankton are an important food source for commercially important fish species, ii) are important indicators of the transient (future) fish population and iii) are very effective in indicating water quality of marine ecosystems.

Tracy Marie Commock

Programme:	PhD in Botany
Field of Study:	Taxonomy of an endemic genus in the family Euphorbiaceae
Supervisor:	Dr. Philip Rose (Mona)
Co-Supervisor:	Dr. Javier Francisco-Ortega (FIU)

I am a graduate of the University of the West Indies, Mona and the University of Reading in the United Kingdom. As an employee of the Natural History Museum of Jamaica, a division of the Institute of Jamaica, my responsibilities include conducting research. I am currently enrolled on a part time basis under the supervision of Dr. Philip Rose.

My research entitled "Taxonomic and Phylogenetic Revision of the Jamaican Endemic Genus *Dendrocousinsia* Millsp. Euphorbiaceae" aims to clarify the taxonomy and phylogenetic relationship of *Dendrocousinsia* Millsp. in the family Euphorbiaceae. *Dendrocousinsia* is one of Jamaica's seven endemic genera of seed plants and is now recognised as comprising 7 species.

During my research all but one species of my group have been collected in the wild and their conservation status updated with four considered to be Critically Endangered. Support from the University of the West Indies through the Graduate Research and Publications Fund has allowed me to pursue a detailed plant anatomy course courtesy of the Florida International University and conduct anatomical and molecular studies at the Fairchild Tropical Botanical Garden. The Fund will also support upcoming exposure to techniques using Scanning Electron Microscopy.

Recently I spent considerable time examining herbarium specimens in Jamaica (University of the West Indies & the Institute of Jamaica) and in the United Kingdom (Royal Botanic Garden, Kew & the Natural History Museum in London). The research led to the publication *Typification and nomenclature of five taxa endemic to Jamaica* (Commock et al, 2017).

I am currently working on an overview of the endemic genera of seed plants in Jamaica and the publication will outline the phylogeny, distribution, conservation status, ethnobotany and phytochemistry of these genera.

My research will provide additional information on Jamaican species which are priorities for national and international initiatives and policies especially those related to protected areas and conservation of rare and endemic plant species.

Department of Life Sciences

Kimberley Coore

Programme: MPhil in Marine Sciences
Field of Study: Coastal water quality and coral reef health in Jamaica
Supervisor(s): Dr. Suzanne E Palmer

In 2016, I graduated from the University of the West Indies, Mona Campus with BSc (Hons) Marine Biology (major) and Geology (minor). My passion for the marine environment led me towards pursuing a MPhil degree in Marine Sciences, working with Dr. Suzanne Palmer to assess the potential linkages between water quality and coral reef health which are, to date, poorly documented in Jamaica.

Jamaica's coral reefs are of strong ecosystem and economic value, however, it is well documented that they are under threat from anthropogenic and natural stressors, including poor water quality. Based in the Department of Life Sciences, this research involves a collaboration with the Department of Chemistry. The project focuses on the Port Royal Cays (PRC) which lie immediately south of Kingston Harbour and its well-documented eutrophic waters.

This research aims to provide a detailed study of PRC coral reef health in conjunction with water quality parameters. Monthly measurements of sedimentation rates, net sediment accumulation rates, total suspended solids, phytoplankton biomass, nitrate and phosphate concentrations of overlying seawater, water currents and light attenuation are being conducted to characterise each reef site. Results from this research will provide the most comprehensive data on coral reef health across the PRC to date, and importantly a unique insight into temporal variations in water quality and associated parameters across the PRC that will serve to inform national coastal management.

This research has been partially-funded by a UWI Research and Publications Award in addition to partial funding from the Kingston Freeport Terminal Limited (KFTL).

Preliminary results of this research were presented at the Department of Life Sciences Postgraduate Research Seminar Series (2017).

Rochelle Shanice Hibbert Daley

Programme: MPhil in Zoology
Field of Study: Forensic Entomology
Supervisor: Dr. Eric Garraway
Co-Supervisors: Dr. Catherine Murphy ; Dr. Tannice Hall

In our crime-ridden country, Jamaica, where numerous murder cases have gone and continue to go unsolved, the field of forensic entomology can be incorporated to aid in criminal investigations.

Forensic entomology is the use of information gleaned from insects associated with a crime scene to help solve criminal and corporate cases. The major use of forensic entomology is the estimation of Post Mortem Interval (PMI); time since death. The field of forensic entomology is relatively new in the Caribbean and it is my goal to contribute to the development of a database specific to the Caribbean to make forensic entomology credible and applicable in our struggling legal system.

My study focuses on the fly family Sarcophagidae, commonly known as flesh flies. Under the title "The Morphology and Biology of Species of Sarcophagids of forensic importance in Jamaica". It is my intention to create a key for the species identified during this study, using immature stages of the fly. This is especially important given the difficulty faced with differentiating adult Sarcophagids.

During the pursuit of my undergraduate degree, I fell in love with Entomology. Having been awarded my undergraduate degree in Animal and Plant Biology (2015), I immediately fell under the guidance of senior lecturer and entomologist Dr Eric Garraway who introduced me to the budding research area. It was a match made in nature as I have adapted the fly family as my own and continue to learn and grow as a researcher.

Research interests me in its dynamicity, never stagnant, constantly challenging and equally rewarding with every new discovery. I am a recipient of the Graduate Studies Scholarship and hope to ultimately upgrade my MPhil research to a PhD.

Department of Life Sciences

Sophia Davis

Programme: PhD in Marine Sciences
Field of Study: Culturing seahorses in Jamaica
Supervisor: Dr. Karl Aiken
Co-Supervisor: Prof. Mona Webber

I received my BSc in Marine Sciences from the University of the West Indies, Mona and my MBA from the University of Manchester. I worked in the field of Aquaculture for 3 years after graduation and later worked in administration at the UWI Bursary on the Mona Campus. I returned to the field of Marine Sciences to explore Mariculture and began my research in developing protocols for captive rearing of the seahorse *Hippocampus reidi*.

Seahorses are fish that live in shallow tropical and temperate waters throughout the world and are one of the ecological indicators of the health of the marine environment. The initial years concentrated on creating the ideal conditions for growing seahorses that would best mimic the natural environment - the mangrove lagoons and seagrass beds in which they are found. Some of the critical factors in developing such protocols include varying the photoperiod, temperature, assessing the impact of different diets on growth and survival and creating new tank designs for the different developmental stages. From the research carried out I have been able to successfully close the life cycle of the *H.reidi* by rearing newborns/juveniles to maturity. Other important aspects of the research have been to observe behaviour and its impacts on fecundity of brood pairs.

Each year, over 1 million seahorses are taken from the wild for the Aquarium trade and it is believed that less than 1,000 survive beyond six weeks. Captive breeding is thought to be the solution to reducing the impact of overfishing on wild populations and sustaining the environment. The successful culturing of this high-demand species can create opportunities for export and income-generation.

Desireina Delancy

Programme: MPhil in Zoology
Field of Study: Entomology
Supervisors: Dr. Tannice Hall ; Dr. Eric Garraway

I am currently pursuing a Master of Philosophy in Zoology within the Department of Life Sciences, UWI, Mona. As a budding Entomologist, the focus of my research is on the aphid *Aphis gossypii,* an insect belonging to the Hemipteran family Aphididae. This aphid feeds from the host plant phloem and indirectly transmits viruses. It is aggressively polyphagous and carries out parthenogenetic reproduction resulting in rapid population growth rates.

My main objectives are to investigate the host preference and levels of insecticide resistance of *Aphis gossypii* for economically significant crops such as cotton *(Gossypium)*, pepper (*Capsicum)* and cucumber *(Cucumis sativus)*. It also involves determining host-based life history and the sequencing of chemosensory genes.

The outcomes will be greatly beneficial to the Jamaica Agricultural sector and the Caribbean at large, facilitating the design of specific Integrated Pest Management (IPM) approaches for dealing with this important pest.

This study has received funding from the Research & Publication Grant.

Department of Life Sciences

Elaine Denton

Programme: MPhil in Botany
Field of Study: Medicinal Botany
Supervisor: Dr. Philip Rose

Having received my BSc degree in Botany and Zoology from the University of the West Indies, Mona, I am now currently pursuing an MPhil degree in Botany within the Department of Life Sciences. Working with Dr. Philip Rose, a range of molecular barcoding techniques and traditional morphological methods will be employed towards the development of a validation assay from the acquired DNA sequences to accurately identify and authenticate medicinal herbs and products in the Jamaican market. Medicinal plants such as: Guinea Hen Weed, Vervain, Cinnamon and Basil mint are widely used in Jamaica for various kinds of ailments like cancers, stomach aches and kidney stones. According to a review published in the *Evidence-Based Complementary and Alternative Medicine* journal, herbs are used around the world to treat conditions and diseases with many studies attesting to their efficacy. In fact, of the one hundred and seventy-seven drugs approved for the treatment of cancer, more than 70% are based on natural or chemical analogues of natural products. Due to the increased use of herbal products to treat diseases, herbal companies have capitalized on the opportunity to maximize their profits at the expense of the quality of the products they offer to consumers. An article published by Steven G. Newmaster in 2013 in the journal BMC Medicine (doi: 10.1186/1741-7015-11-222) stated that many Herbal Companies in North America were selling herbal products adulterated with fillers and substitutes. Therefore, this research is directed at accurately identifying plant products at the molecular level, and hence seeks to standardize the quality of preparation and processing of herbal products.

Candiece Karima Duscent

Programme: MPhil in Zoology
Field of Study: Freshwater Biology
Supervisor: Dr. Eric J. Hyslop

I obtained my B.Sc. with first class honours in Environmental Biology from the UWI Mona in 2014. I am currently pursuing an MPhil in Zoology, under the title "An assessment of the Biology and Ecology of *Sicydium* spp. (Family Gobiidae) from Yallahs and Swift Rivers, Jamaica". I am researching fish biology because of the decline in numbers of many Jamaican fish species and the lack of biological data on these species.

My graduate research concerns *Sicydium* spp., the suckstone goby,which is present in Jamaican rivers. Little is known about the biology of *Sicydium* in Jamaica. *Sicydium* are small migratory fishes which spend most of their life in rivers but migrate to the sea to reproduce. There is an artisanal fishery for young fish which return to rivers from the sea.

My study, partially supported by a UWI Research and Publication Grant, has two parts. The first, involves a comparison of the biology of *Sicydium* from two locations in Jamaica; a north coast, (Swift River) and a south coast, river (Yallahs River). Yallahs River has sand mining operations along its length, which cause disturbance to the substrate. Swift River is a more pristine watershed.

The second part of the study aims to examine which *Sicydium* species occur in Jamaica, as this is not established.

Results indicate significant differences in the biology of the two populations, for example, comparison of diets in the two watersheds show a greater preponderance of microscopic algae in specimens from the Yallahs watershed.

Upon completion, the data generated will enable a definitive statement on the species of *Sicydium* found in Jamaica as well as determining how environmental factors affect the biology of *Sicydium* populations. Such information will be used to inform management decisions on best practices to be implemented to enhance survival of the species and make predictions on the impact of decline of *Sicydium* on the food web of Jamaican river systems.

Department of Life Sciences

Latoya Foote

Programme: PhD in Zoology
Field of Study: Forensic Entomology
Supervisor: Dr. Eric Garraway

I received my BSc in Experimental Biology and MPhil in Zoology from the University of the West Indies. I am currently pursuing a Doctor of Philosophy in Zoology; focusing on Forensic Entomology. I fell in love with entomology as an undergraduate and I had an opportunity to continue my studies in Entomology and initiate my own forensic studies under the supervision of Dr. Eric Garraway.

Forensic entomology involves analysis of arthropods and their association with legal matters. My research focuses on information obtainable from forensically important species, examining issues such as their role in insect succession on carrion, both exposed to the surface and buried. A major focus of my study is the biology of dipterans of forensic importance associated with buried carrion. Additionally, I seek to understand the use of dipterans in the estimation of Post Mortem Interval (PMI) based on their succession and behavioral response to the carrion.

The data obtained in this study will aid in implementing the use of forensic entomology in criminal investigations in Jamaica.

Troy L. Franklin

Programme: M.Phil in Zoology
Field of Study: Macroinvertebrates in Salt River
Supervisor: Dr Eric Hyslop

After completing my Environmental Biology (Double Major) Degree in 2012 at the University of the West Indies, Mona, I continued my studies within the Department of Life Sciences in 2014 to pursue a Master's degree (MPhil) in Zoology.

Working with Dr. Eric Hyslop, I sought to broaden the understanding of the role water salinity plays in macroinvertebrate diversity in Jamaica. My area of study, Salt River (13.9‰), is roughly thirty times saltier than average rivers globally (0.5‰). Most invertebrates can only tolerate a narrow range of salinities, especially insects (<5‰). Salt River, and the canal connecting it to the fresh water Cockpit River, were sampled for data on the taxonomy and salinity limitations of macroinvertebrates inhabiting the area.

Salt River was found to have a rich diversity of invertebrates, including insects. Potentially, these data can be used for increasing awareness of species diversity and knowledge of potential distribution and tolerance ranges of invasive and economically viable species.

Department of Life Sciences

Sashonie Goodwin

Programme: M.Phil in Zoology
Field of Study: Benthic Macroinvertebrates
Supervisor: Dr. Eric J. Hyslop

I completed my first degree here at the University of West Indies, Mona, graduating with a B.Sc. in Environmental Biology (Double Major) in 2012 and worked for a year on campus. During that year, I visited my family in rural Manchester where we went to an isolated river that I was told ran a very long course, creating a series of waterfalls and flowing underground in some areas.

There is no information about the rivers in this area readily available. These rivers flow from the Cockpit Country water shed and are important as they provide sources of water for domestic purposes for many people living in these areas, several of whom have no running water in their homes.

Under the supervision of Dr. Eric Hyslop, I am in the process of writing a thesis on the Study of High Altitude Rivers in Central Jamaica (Upper Manchester and Lower Trelawny) where I seek to provide a comparison of the undisturbed and disturbed sections of each river in terms of benthic macroinvertebrate families and composition, and how they are affected by physicochemical parameters. Additionally, the study seeks to determine the differences and similarities among the rivers and compare the findings with a typical low lying Jamaican river.

This research will broaden the understanding of Jamaican rivers increasing the data pool available and to increase our knowledge on the impact of disturbance on the benthic macroinvertebrate community in fresh water.

Ramona Jaggon

Programme: MPhil in Marine Sciences
Field of Study: Coral Reef Restoration
Supervisor: Dr. Suzanne Palmer
Co-Supervisor: Dr. Andrew Ross, Mr. Peter Gayle

In 2017, I received by BSc degree in Environmental Biology from the University of the West Indies, Mona. Immediately after, I started the MPhil programme where I decided to focus on coral reef ecosystems with Dr. Suzanne Palmer as my supervisor.

Coral reefs have drastically been degraded over the years as a result of anthropogenic and natural disturbances. Although coral reefs occupy only a small portion of the marine environment (<1%), they support more than one third of all known marine species.

My current project focuses on restoring the Port Royal Barrier Reef using the Staghorn coral (listed as critically endangered on the IUCN Red List) along with the Mustard Hill coral in hopes to restore the vital functions which the coral reef once provided.

Department of Life Sciences

Jheanell Johnson

Programme: PhD in Zoology
Field of Study: Parasitology
Supervisor: Prof. Ralph Robinson
Co-Supervisor: Prof. Byron Wilson

Invasive species are known to have negative effects on the biodiversity of the environments in which they are introduced. These effects include the displacement and disappearance of native species either through increased competition, predation or transmission of novel parasites and diseases.

The cane toad, *Rhinella marina*, and the American bullfrog, *Lithobates catesbeianus*, are in the top 100 worst invasive species in the world. Jamaica is home to several native species and currently there is no data on the effects of the cane toad and American bullfrog on these species.

This study aims to identify the parasite community of both invasive frogs as well as the impact of their diet on the environment and in the transmission of their parasites.

Lloyd Johnson

Programme: PhD in Botany
Field of Study: Sweet potato viruses in Jamaica
Supervisor: Prof. Paula Tennant
Co-Supervisors: Prof. Marcia Roye and Prof. Pathmanathan Umaharan

I am a graduate from the class of 2007, receiving my B.Sc. degree in Botany and Physics from The University of the West Indies, Mona. I continued my studies within the Department of Life Sciences in 2011 as a Botany M.Phil. candidate before upgrading the research project, becoming a Ph.D. candidate in 2016 with the thesis project: "Isolation and Characterization of Sweet Potato Viruses in Jamaica". Under the supervision of Prof. Paula Tennant, I used a range of serological and molecular biology techniques to develop a catalogue of viruses infecting sweet potato (*Ipomoea batatas*) in Jamaica.

Sweet potato is an important food crop grown primarily in the tropics and subtropics and is the third most important root crop grown globally, after potato (*Solanum tuberosum*) and cassava (*Mannihot esculenta*). Various viral diseases responsible for yield loss, production decline and severe stunting have been reported in sweet potato worldwide, but only a few have been well studied and characterized compared to viruses of other crops. The data generated from this project are needed as the first step toward the development of management strategies of virus diseases in sweet potato.

Grants Awarded

2012 TWAS Research Grants Programme in Basic Sciences; 2013 and 2016 UWI Research and Publications Graduate Awards Grant; 2017 Protection of Plant Genetic Resources for Food and Agriculture Grant.

Publications & Presentations

1. Johnson L., Umaharan P., and Tennant P., 2015. The Detection of Sweet potato Viruses in Jamaica. *CARISCIENCE 16th Annual Conference and General Meeting: Science and Technology for Sustainable Development in the Caribbean.* University of the West Indies, St. Augustine, Trinidad. Oral
2. Johnson L. and Tennant P., 2012. Viruses Infecting Sweet Potato in Jamaica. 16th Triennial Symposium ISTRC: The Roots and Tubers of Development and Climate Change. Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. Oral
3. Johnson L., 2010. Improving Market Access of Caribbean Agricultural Products with Information & Communication Technologies. Agriculture Rural Development & Youth in the Information Society Essay Contest. Technical Centre for Agriculture & Rural Cooperation. Conference Proceedings
4. Johnson L. and Simpson L., 2009. Development of Lemongrass (*Cymbopogon sp.)* & other Medicinal Herbs in the Caribbean. Proceedings of the Caribbean Food Crop Society. 45: 94. Oral

Department of Life Sciences

Tedi-Ann Laidley

Programme: MPhil in Botany
Field of Study: Coastal Ecosystems
Supervisor: Dr. Philip Rose
Co-Supervisor: Prof. Mona Webber

I received my BSc degree in Marine Biology with Botany and Conservation minors from the University of the West Indies, Mona. I continued my studies within the Department of Life Sciences in 2013 and pursued an MSc degree in Marine and Terrestrial Ecosystem Management.

Working with Dr. Philip Rose, I will perform visual as well as physical assessment of mangroves seedlings in approximately seven sites along the southern coastline of Jamaica. Physical assessment will include measurement of seedling stock as well as their growth within a 2 to 3 year time period. A control experiment will be conducted that will determine a growth rate under varying conditions such as salinity, temperature and soil pH.

The data generated from the project will contribute to the knowledge base regarding the status of Jamaica's mangrove ecosystems and how they are growing and regenerating naturally and what factors most influence their life cycle and mortality.

Aliza Lindo

Programme: PhD in Botany
Field of study: Diversity of Cocoa in Jamaica
Supervisors: Dr. Robinson and Prof. Paula Tennant
Co-supervisor: Dr. Dapeng Zhang

After receiving my BSc. in Experimental Biology (double major) in 2009, I went on to pursue a MSc. in Plant Production and Protection at which time I was given a glimpse of life as a researcher. Upon receiving my MSc. in 2011, I had the burning urge to address recommendations I made in my MSc. Cocoa (*Theobroma cacao*) project. That desire led me to pursue a PhD degree in Botany with a working thesis title of: "Genetic characterization of cocoa in Jamaica, and the phenotypic evaluation of the unique genotypes identified".

Cocoa has been significant to Jamaica's agricultural sector over the last 50 years. Several international reports have stated that cocoa produced in Jamaica have a unique flavour and the country is ranked as one of the leading producers of fine flavoured cocoa with Hershey being one of the major clients. However, over the last decade, there has been a drastic decline in production, and now there is a thrust towards redeveloping the local cocoa sector through rehabilitation of existing fields and introduction of new materials. With this approach, there has been a boost in Jamaica's cocoa industry, but production has not yet reached the numbers the country once held.

My research involves assessing a representative subset of cocoa trees in Jamaica and conducting phenotypic evaluations on selected genotypes to identify characteristics unique to these genotypes. This study on Jamaican cocoa is the first of its kind and utilizes the molecular technique - Single Nucleotide Polymorphism (SNP). Some 140 different genotypes have been identified based on 94 SNP markers. Using a cocoa descriptor list from Trinidad consisting of qualitative and quantitative measurements, interesting phenotypic features were subsequently identified. The findings of this study can be used to select cocoa plants with desirable traits, such as, trees yielding higher bean numbers per pod. The plants can then be propagated and seedlings distributed to farmers thereby increasing the country's overall production.

My research has afforded me the opportunity to share these findings at the 2nd Annual Caribbean Fine Cocoa Conference and Chocolate Expo in 2011 and at the 2017 International Fine Cocoa Innovation Centre 2nd Conference, Symposium & Chocolate Exposition.

Funding for the research has been through the Office of Graduate Studies and Research and the Jamaica Cocoa Farmers' Association (JCFA) through the project: "Revitalizing the Jamaican cocoa sector".

I end with a quote I strive to live by: *the race is not for the swift but for those who can endure.*

Department of Life Sciences

Toni-Ann L. Miller

Programme: MPhil in Environmental Biology
Field of Study: Thermal Springs in Jamaica
Supervisor: Dr. Eric Hyslop

I received my Bachelor of Science from UWI Mona and am now pursuing an MPhil (Environmental Biology) in the Department of Life Sciences. I have received financial assistance from UWI Research and Publications Committee and am about to present some of my results at the 11th Faculty conference this April.

The objectives of my study are to compare the physicochemical conditions and benthic macroinvertebrate (BMI) communities of two rivers in St. Thomas, Jamaica: Sulphur River, which receives thermal inflow from Bath Springs and Island River which does not receive thermal spring input. Thermal springs discharge water with a temperature above mean annual air temperature (MAAT), ~27^{0}C in Jamaica. The terms hot spring and warm spring, are commonly used when describing thermal springs. Bath Springs are classified as hot springs (maximum 51^{0}C).

Thermal springs often increase the water temperature of rivers which receive their input and alter the composition and distribution of the fauna. Research concerning BMI communities in rivers with thermal springs has been carried out mainly in temperate regions.

Results so far indicate that input from Bath Springs does not increase the water temperature of Sulphur River but differences in faunal composition do exist between Sulphur River and the control location. A total of 30 BMI families have been identified from analysis of >1600 specimens. Less than 50% of these families were found at points where the Bath Springs flow into Sulphur River. These faunal differences may be as a result of other factors resulting from input from Bath Springs such as increased sulphur levels or human activity.

The importance of this work is that the data generated from this research form the first information on the invertebrate communities of thermal springs in Jamaica and the broader Caribbean region.

Fradian Murray

Programme: MPhil in Botany
Field of study: Cassava propagation
Supervisor: Dr. Jane E Cohen
Co-supervisor: Dr. Lisa Myers-Morgan

My aim is to refine the multiple shoot removal technique designed at CIAT Colombia for rapidly propagating cassava for use in the Jamaican industry. The resilience of cassava to extreme weather conditions and ultimately climate change indicates that it has an important place in future food security in Jamaica. However, in 2016, 5054 tonnes of both sweet and bitter cassava were produced in Jamaica, an eighth of that for yams (MICAF Agridata 2016).

Cassava cultivation in Jamaica is traditionally by subsistence farmers, but recently, larger growers are taking up the crop and since Red Stripe started production to reduce its importation of high maltose corn syrup, the profile of cassava has been raised.

Cassava is propagated vegetatively using stakes, which are 30-40 cm long stem pieces taken at harvesting from shoots of one crop, to supply new fields. This long crop cycle and low multiplication rate introduces limitations for available planting material. Therefore there is a need to use a faster method to facilitate the supply of selected, high quality propagating material. The multiple shoot removal technique is one such method and I am investigating the ideal stake physiological conditions for successful propagation of cassava varieties which have been introduced as high-yielding and well suited to Jamaican producers. The conditions include stem development, plant age and nutrient content. I believe that providing growers with a protocol for the conditions under which six of the selected varieties can be rapidly propagated, I would have helped in generating interest in a crop which previously has been undervalued in this country. I have received two grants from the UWI Office of Graduate Studies and Research which have fueled the progress of this study and consistent support from the MICAF's R&D stations at Bodles and Montpelier to set up trials in the Department of Life Sciences here at UWI, Mona. I have high hopes for this crop in Jamaica.

Department of Life Sciences

Ameka Myrie

Programme: MPhil in Environmental Biology
Field of Study: Agricultural Pest Management
Supervisor: Dr. Dwight Robinson

Having successfully completed studies towards a BSc. in Environmental Biology in 2014, I sought to identify ways in which I could have a positive impact on the Jamaican environment. Having always heard of the importance of coffee to the Jamaican economy and having been made aware of the challenges faced by that industry and the negative environmental impact associated with efforts to overcome some of those challenges, I decided to pursue a Master of Philosophy in Environmental Biology in 2015, in the Department of Life Sciences focusing on the management of the coffee berry borer, *Hypothenemus hampei* (CBB), which results in losses to the industry in excess of J$130 Million annually.

With current attempts at the management of the pest based on data generated over 30 years ago, the research is aimed at providing current data on the activity and infestation levels of the CBB as well as its spatial and temporal distribution in the Blue Mountains and Highlands of Jamaica. The impact of various biotic and abiotic factors on the activity of the CBB was also assessed.

The data generated will provide a platform to develop cost-effective approaches to the monitoring of the pest and the development of economic injury levels and economic thresholds that will allow for the development of time-sensitive and area-specific integrated pest management programmes. Such programmes would provide a more balanced and structured way of managing the CBB and should reduce the current high level of dependence on chemical control, thus reducing the negative impacts of the insecticides used in the sensitive ecosystems in Jamaica, where coffee is grown.

Damion O. Neath

Programme: MPhil in Zoology
Field of Study: Entomology/Pest Management
Supervisors: Prof. Paula Tennant &
Dr. Dwight Robinson

After completing my BSc in Experimental Biology from the University of West Indies, I decided to do an MPhil focusing on Entomology, specifically Pest Management, due to the economic importance of Lepidopteran pests to the Agricultural sector and the need to reduce the use of highly toxic and hazardous chemicals in the management of these pests. My project is entitled "A glimpse into the genetic variation of three armyworm species, *Spodoptera exigua*, *Spodoptera latifascia* and *Spodoptera frugiperda* in Jamaica".

Different genetic indices and phylogenetic relationships for the respective species of armyworms were determined from three highly conserved gene sequences amplified by PCR (polymerase chain reaction) and assembled using molecular biology software tools. Interestingly, the findings so far indicate that there are no unique armyworm lineages in Jamaica. That is, the haplotypes found in Jamaica are found elsewhere.

This type of study is important since genetic data can help in the development of IPM strategies that efficiently target pests. Genetic data can be used to predict and measure the effects of management practices, although to date, they have infrequently been used for this purpose.

Department of Life Sciences

Dionne Newell

Programme: PhD in Zoology
Field of Study: Environmental Conservation
Supervisor: Dr. Eric Garraway

I am a graduate of the University of the West Indies with a Bachelor of Science degree and a Master of Philosophy in Zoology. I am currently a PhD candidate in the Department of Life Sciences. The project is entitled, "The Convention on Biological Diversity (CBD): An Analysis if its Effectiveness on Biodiversity Conservation in Jamaica".

My research involves an investigation into the effectiveness of an international environmental agreement, to which Jamaica is Party, on biodiversity conservation in Jamaica. The Convention on Biological Diversity (CBD) was established to address the global concern of increased threats to biodiversity and achieve its main goals which include, the conservation of biological diversity, sustainable use of its components and the fair and equitable sharing of benefits that arise from its use. The success of many conventions depend on factors such as the technical and financial capacities of member states to implement various components as agreed in the 'regulations' of the convention. This study hopes to provide some insight into the operational effectiveness of the CBD in Jamaica through analysing variables such as local legislation and public awareness and the environmental response/outcome. This will be achieved by observing the current status and process of implementation, as well as the population response of target species in select areas. Using a mixed-methods approach, data will be collected using qualitative and quantitative methods. Questionnaires will be administered to key stakeholders directly and indirectly involved in the implementation of the convention with follow-up interviews and other relevant activities.

The outcome of its implementation will be assessed by way of monitoring population trends in select species. The results are intended to provide guidance at the national level on the most effective methods for implementation of the convention, based on Jamaica's financial and technical capacities that enable the country to fulfil its international commitment.

Zahra H. Oliphant

Programme: PhD in Zoology
Field of Study: Freshwater Ponds
Supervisor: Dr. Eric J. Hyslop

I received my BSc degree in Zoology and Biochemistry (2008), after which I completed my MPhil in Zoology (2011) and following that I registered for my doctoral studies in September, 2013. I have done presentations on my doctoral thesis at the start of sampling (graduate seminar), during the sampling period (FST Conference of 2015) and upon completion of sampling (seminar).

Presently, my thesis has been completed with submission pending and the title of this research is: "Determination of biomass and productivity, population dynamics and functional feeding categories of Benthic Macroinvertebrates in eight high altitude ponds (St. Ann, Jamaica)". The thesis examines the macroinvertebrate community in freshwater ponds and seeks to address the information gap that currently exists for such habitats in Jamaica and the wider Caribbean. The results are significant because the data provide a benchmark against which other studies can be compared. As it relates to the study of

macroinvertebrates, this research represents the first of its kind in Jamaica to:

1. formulate length-mass regression equations that can be used by others for mass determination,
2. determine production and biomass turnover rates, and
3. examine the dietary components of Odonata and Ephemeroptera taxa.

Department of Life Sciences

Tracy Ann Smith

Programme: MPhil in Botany
Field of Study: Plant Metabolomics
Supervisor: Prof. Noureddine Benkeblia

My research involves investigating the changes in the metabolite profile of June Plum (*Spondias cytherea*), Star Fruit (*Averrhoa carambola*) and Otahetie Apple (*Syzygium malaccense*) grown in Jamaica.

In my study, I focus mainly on the identification and quantification the primary metabolism metabolites i.e. sugars, sugar alcohols and organic acids in these fruits at the immature, mature and ripe stages. Through a grant obtained from the Office of Graduate Studies & Research, I was able to travel to Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional (CINVESTAV-IPN) in Mexico to carry out analytical tests involving the profiling of the metabolites using Gas Chromatography- Mass Spectrometry (GC-MS) experiments. The work conducted in Mexico was done with Prof. M. Lopez as collaborator of my supervisor.

Although not traditionally exported from Jamaica, these fruit crops are becoming more economically important to Jamaica. In the past, these fruits were sold to consumers in their fresh state, however, in recent years, companies have started to create value added products using these fruits, indicating potential for future economic development.

Sanya Steen

Programme: PhD in Botany
Field of Study: Plant Metabolomics
Supervisor: Prof. Noureddine Benkeblia
Co-Supervisor: Prof. David Livingston

I graduated with an MPhil in Botany in 2011, during which I received the George Sidrak scholarship for students in plant sciences. Thereafter I continued working in the Department of Life Sciences pursuing a PhD in Botany.

FOS are a functional food and are present in more than 500 food products, and are also known for their many health-promoting benefits, including their role as prebiotics. Therefore, the research work I am currently conducting is using onion as a model of fructans-containing plants to help understand the biosynthesis of these metabolites during bulbing. My main research focuses on the fructooligosaccharides (FOS) and their related metabolites produced during bulbing.

During my research work, I received two graduate awards which afforded me the opportunity to do two oral presentations at two international conferences, as well as my bench work at the Laboratory of Natural Products, Biochemistry at CINVESTAV-IPN (Centre for Research and Advanced Studies of the National Polytechnic Institute), Irapuato Unit, Mexico.

Department of Life Sciences

Alex Sybron

Programme: MPhil in Botany
Field of Study: Plant Metabolomic
Supervisor: Prof. Noureddine Benkeblia
Co-Supervisor: Dr. Kisan Vaidya

With my innate love for plants, I received my B.Sc. in Tropical Horticulture (First Class Honours) from The University of the West Indies, Mona. I was still not fully satisfied as I am currently pursuing a M.Phil. in Botany primarily focusing on 'Some anti-oxidant properties of phenolic compounds and metabolomics profiling of different ripening stages of the Ackee (*Blighia sapida*) seeds and arils'.

An international presentation was done in Minneapolis, Minnesota, USA where aspects of my research were shared with scholars and innovators in this field of research from across the world.

Being a Resident Advisor on the Elsa Leo-Rhynie Hall of Residents while demonstrating labs to undergraduate students, taught me good time management which is a key factor in this Masters programme.

My supervisors continue to provide invaluable support and guidance as we aim to improve human health and reduce hunger using the ackee fruit which is an emblem of our national identity.

Camilo Trench

Programme: PhD in Marine Sciences
Field of Study: Rehabilitation of Mangrove Forests
Supervisor(s): Prof. Mona Webber

I attained an MSc in Tropical Ecosystems Assessment and Monitoring from the University of the West Indies. Research was conducted and a subsequent thesis was submitted during this course on: "Nursery propagation and best practices on mangrove plants in Jamaica". This topic was expanded to facilitate the operation of Jamaica's first mangrove nursery through grant funding from the Forest Conservation Fund.

This research led to an MPhil research project entitled "Mangrove forest rehabilitation approaches in variable damaged mangrove environments across Jamaica". My work on this topic under the supervision of Dale and Mona Webber has been instrumental in the adoption of sustainable coastal forest rehabilitation practices in Jamaica, highlighting the need for an ecological approach to the restoration/rehabilitation of these vital coastal forests.

The majority of mangrove rehabilitation projects worldwide have resulted in failure due to incorrect approaches, so getting it right in Jamaica is important. Notable related projects include the Mangrove Forest Rehabilitation along the Palisadoes roadway in Kingston.

I have presented on my research locally and internationally, and more importantly through the Dept. of Life Sciences, have provided guidance, advice and consultancy to NGO's and Government agencies on the best practices to conserve Jamaica's remaining coastal forests.

Department of Life Sciences

Damion Whyte

Programme:	PhD in Zoology
Field of Study:	Conservation Biology
Supervisor:	Dr. Eric Garraway
Advisors:	Dr. Catherine Murphy and Dr. Tannice Hall

I am a PhD student at the University of the West Indies (UWI), Mona, with a M. Phil., titled "The effect of bird predation on arthropods in three coffee farms under different management practices in the Blue Mountains, and a B.Sc., in Environmental Biology. I also received a Postgraduate Diploma in Environmental Management from the Centre for International Postgraduate Studies of Environmental Management, Dresden University, Germany.

My current study is titled, "The evaluation of the Goat Islands for the reintroduction of the Jamaican Iguana (*Cyclura collie*)", one of the most endangered lizards in the world. The main contributor to the near extinction are invasive predators, such as the Indian mongoose, feral dogs, cats and pigs. One of the main objectives of the study is to estimate the number of predator species that are on the island. Upon completion, this study will provide key information that will enable stakeholders to reintroduce the Jamaican Iguana, and other endemic species, to the Goat islands. It will also provide information on how to manage invasive species such as the Indian mongoose.

Under Dr Eric Garraway's guidance, I have received grants to undertake training in Camera Trapping Study Design and Data Analysis of occupancy and Density Estimation" at the Smithsonian-Mason School of conservation, USA and also funding to acquire camera trapping equipment.

I am currently working with and have made presentations to a number of international groups including the International Iguana Foundation (IIF); and local groups including the Jamaican Iguana Recovery Group, the Urban Development Corporation (UDC), the National Environment and Planning Agency (NEPA) and NGO's for the protection of the endangered iguana.

The Department of MATHEMATICS

Department of Mathematics

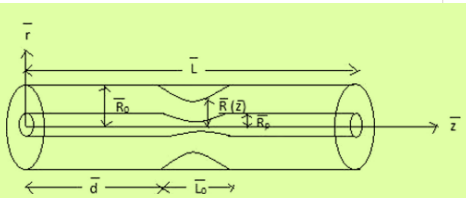
Ajani Ausaru

Programme: MPhil in Mathematics
Field of Study: A Study on Dispersion Phenomenon in Physiological Fluid Flows
Supervisor: Dr. Nagarani Ponakala

I am currently an Assistant Lecturer in the Department of Mathematics in the Faculty of Science and Technology at the UWI Mona Campus. I attained my MSc. Mathematics degree in 2012, and as a part of my continued academic development I am presently pursuing a Master of Philosophy in Mathematics with the singular intention of upgrading to a Doctor of Philosophy in Mathematics in the near future. In tandem with Dr. Nagarani Ponakala, I have looked at the pulsatile flow of Casson fluid under the influence of body acceleration.

I presented a poster related to the aforementioned theme at the recently held UWI Research Days 2018. Normal blood flow is a consequence of the pumping action of the heart, this pumping action in turn produces a pressure gradient throughout the circulatory system. Moreover, the human body is routinely subjected to acceleratory or vibratory motions from say driving, operating machines, playing sports, etc., and the body adapts. But when these velocity changes are dramatic, then serious physiological effects may accrue. These effects include, but are not limited to headaches, loss of vision, vertigo, increased pulse rate, and hemorrhaging.

The variation of the velocity for the flow parameters is analyzed and an increase in velocity due to the presence of body acceleration compared to the absence of body acceleration is observed. The current theory is appropriate for pulse wave behavior in very small blood vessels such as arterioles. An understanding as to the effects of vibrations on the body could be very useful in the diagnosis and treatment of health issues such as joint pain and vision loss, as well as for the design of protective gear.



Ricardo Baccas

Programme: MPhil in Mathematics
Field of Study: Difference Equations
Supervisor: Prof. Alexandra Rodkina
Co-Supervisor: Dr. Conall Kelly

I received my BSc and MSc degrees in Mathematics and a Diploma in Mathematics Education from the University of the West Indies, Mona. I continued my studies within the Department of Mathematics in 2016 and is currently pursuing a MPhil degree in Mathematics.

Working with Prof. Alexandra Rodkina and Dr. Conall Kelly, I was able to construct a timestep sequence that ensures solutions of the unperturbed cubic difference equation to converge to a finite limit and show that the summability of the timestep sequence determines whether or not that limit is zero.

I further examine the convergence of solutions under the influence of a deterministic perturbation and two kinds of stochastic perturbation; one bounded noise, and one with Gaussian noise.

Difference equations are models widely used in applications in mathematical biology, economics, physics, engineering, among others.

Department of Mathematics

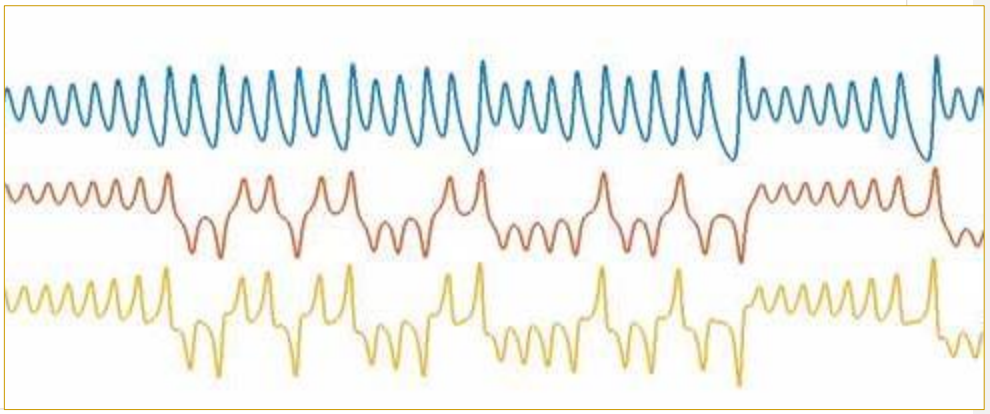
Omar Forrest

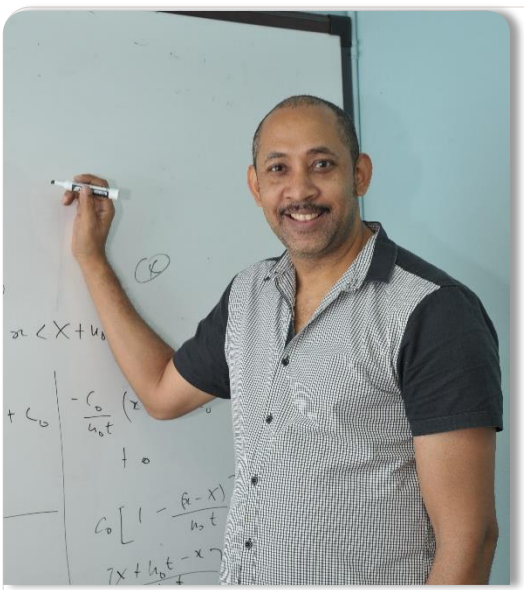
Programme: MPhil in Mathematics
Field of Study: Differential equations and Special Functions
Supervisors: Dr. Davide Batic (K.U.S.T) and Dr. Nagarani Ponakala (U.W.I.)

I am currently a student at the University of the West Indies, Mona enrolled in the M.Phil. in Mathematics Programme. I earned my B.Sc. Degree, which comprised a Mathematics Major and a General Chemistry Minor, from the UWI, Mona Campus in 2014.

I received a Research and Publication Grant from The UWI which allowed me to work with Dr. Batic at the Khalifa University of Science and Technology (K.U.S.T.) in Abu Dhabi, UAE for one month.

My current research involves the construction of new indefinite integrals for the Heun family of functions. The application of Heun's equation and its confluent cases are ubiquitous in scientific disciplines such as Chemistry, Physics, and Engineering. Hence, the study of the mathematical properties of Heun's equation and its solution are of utmost importance as it will aid in solving problems in those areas.





Omar Golaub

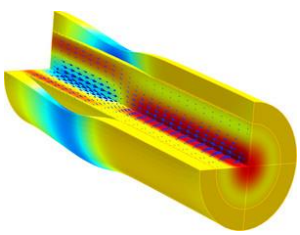
Programme: MPhil in Mathematics
Field of Study: Physiological Fluid Flow
Supervisor: Dr. Nagarani Ponakala

Dispersion theory has several significant applications in varied fields such as chemical engineering, environmental science and physiological fluid dynamics. The dispersion theory plays a significant role in chromatographic separations in chemical engineering, the pollutant transport in the environment, the transport of nutrients and drugs in physiological systems. Also, in physiological systems, it is often necessary to introduce a quantity of solute into the blood stream and to measure its concentration at some point downstream as it flows along blood.

Peristalsis is a mechanism for pumping fluid in a conduit by means of a moving contractile ring around the conduit, which pushes the material onward. Peristalsis is an inherent property of many biological systems consisting of smooth walls, which transport bio-fluids by their propulsive movements. The peristaltic mechanism can be found in the transport of urine from kidney to bladder through the ureter, the movement of chime in the gastrointestinal tract, transport of lymph in the lymphatic vessels, the intra-uterine fluid motion etc. It is very much essential to analyze the interaction of peristalsis with dispersion to understand the mass transport flow in above physiological situations.

The proposed project involves modeling dispersion process in channel with peristaltic nature. Mathematical modeling, using the principles of fluid dynamics, will be developed with a view to understand the dispersion phenomena in channel. The governing equations will be solved analytically and/or numerically.

Simulations of the model will be done using MATLAB software. The effect of pertinent parameters will be discussed on dispersion coefficient and mean concentration.



Department of Mathematics

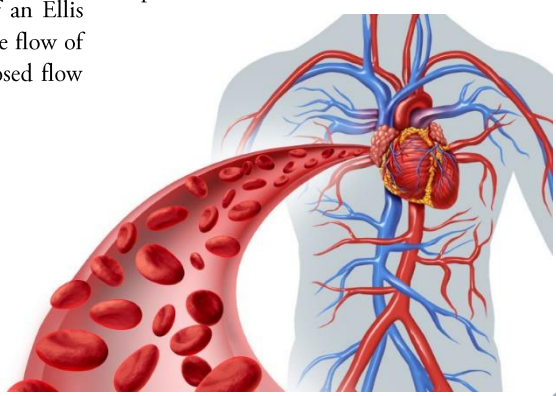
André Small

Programme: PhD in Mathematics
Field of Study: Physiological Fluid Flow
Supervisor: Dr. Nagarani Ponakala

After receiving a BSc degree in Mathematics and Physics with honours from the University of the West Indies Mona, I subsequently received an MPhil degree in Mathematics graduating with high commendations.

I completed a thesis on Peristaltic transport of a Newtonian Fluid in Finite Length Tubes which was an enhancement of previously existing models. Currently, I am pursuing a Ph.D. degree in Mathematics within the Department of Mathematics, again working with Dr Nagarani Ponakala. We are investigating fluid flow of an Ellis fluid in order to further explore the flow of varying fluid types in several imposed flow conditions.

The flow of an Ellis fluid in tubes and channels is investigated, with the results on the relevant flow parameters generated, displayed in plots created using Mat-Lab. The information obtained in these Mathematical methods are necessary for understanding the transport of the varying fluid types throughout the human and other physiologies, as well as other industrial applications. These Mathematical methods provide an alternative to expensive experimental procedures and avoid the ethical risks associated with such experiments.



The Department of PHYSICS

Department of Physics

Barrington A. Brevitt

Programme:	MPhil in Applied Physics
Field of Study:	Medical Physics
Supervisors:	Prof. Mitko Voutchkov; Dr. Peter Johnson
Co-supervisor:	Mrs. Lisa Burnett

My research is entitled "Applying Radiation Safety Standards and Optimizing Radiation Management for Jamaican Radiation Workers". While conducting the research component of my Master of Science Degree in Medical Physics, it was discovered that radiation management and safety within Jamaican radiology centers was very heterogeneous and in some cases non compliant with the Jamaican Nuclear Safety and Radiation protection Act. This research seeks to determine the efficacy of an intervention (radiation management programme) on behavioural modification with regards to radiation safety and management among Jamaican radiation workers.

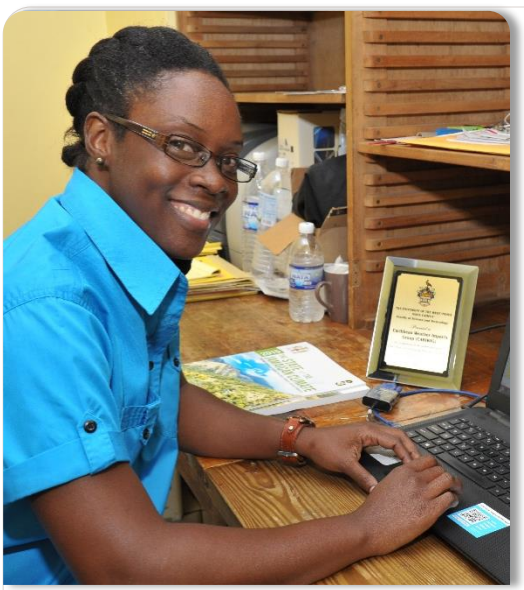
The research is being conducted in two phases:

1. Phase one: A radiation safety audit to determine base line radiation protection practices among radiation workers
2. Phase two: A post intervention case study to evaluate the effectiveness of the intervention on behavioural modification.

To date, presentations have been done at 2 local conferences (UWI-FMS Research Conference, 2017 and MOH annual Research Conference, 2017) and an abstract was accepted for the ISRRT conference in April 2018.

No grants have been received however; application was tendered for a Research and Publication grant.

It is hoped that this research will streamline radiation management and increase compliance with the law.

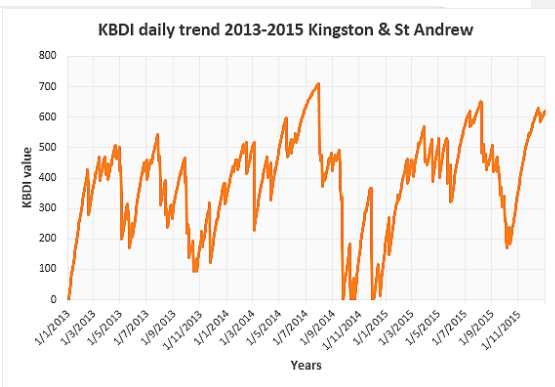


Candice Charlton

Programme:	MPhil in Physics
Field of Study:	Drought indices and bush/wildfire risk prediction
Supervisor:	Dr. Tannecia Stephenson

I received my BSc degree in Energy and Environmental Physics from the University of the West Indies, Mona campus in 2015 and subsequently began my MPhil degree in 2016. Environmental Physics is my passion and so the project Dr. Stephenson and I focused on uses the Keetch-Byram Drought Index (KBDI) and Land Surface Temperature (LST) to characterize historical fire data and model future fire potential in Jamaica. Lack of water is not the only devastating effect of droughts; they also increase the frequency and intensity of bushfires which is a growing socio-economic issue. Jamaica has been losing increasing revenues from the agriculture sector due to this very issue.

KBDI and LST give us the opportunity to establish historical trends and patterns as well as use future scenarios and models to forecast fire potential utilizing climatological and meteorological data. In the furtherance of this study and my degree, I received a Research and Publication Grant



from the Office of Graduate Studies and Research in aid of my presentation titled: "Investigating wildfire risk for a small island and the potential use of remotely sensed data: A Jamaica case study", at the European Geoscience Union 2018 conference from April 8th -13th. Successful completion of this project will provide Jamaica with a means of improving Bush/Wildfire Management and reduce or adapt to future incident probabilities in key sectors.

Department of Physics

Alton Daley

Programme: MPhil in Physics
Field of Study: Renewable Energy
Supervisor: Prof. Michael Taylor and Dr. Jean Francois Dorville

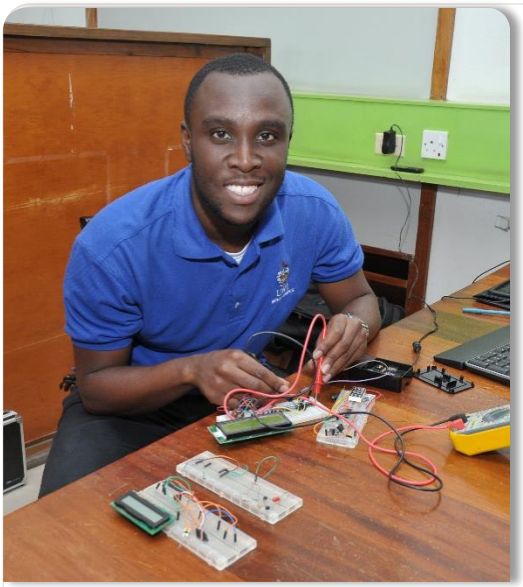
I received my BSc degree in Energy and Environmental Physics from the University of the West Indies, Mona. I continued my studies within the Department of Physics in 2015 and am currently pursuing a MPhil degree in Physics.

Working with Prof. Michael Taylor and Dr. Jean Francois Dorville, I am using a combination of numerical models - WW3, SWAN and SWASH - to characterize Jamaica's wave energy resources.

Sustainable energy is a matter of grave concern within the Caribbean region. Energy requires immediate attention as conventional fuel sources continue to have catastrophic effects on not only the environment but also on the economies of Caribbean nations. A number of renewable energy sources have been proposed as possible solution but based on the literature only one country within the English speaking Caribbean has done studies in this field.

The data generated from this project is essential as it provides information regarding the sea state of the waters surrounding Jamaica which is seen as the first step towards harnessing the power of these waves.

I did my first presentation at the American Geophysical Union's recently concluded conference in New Orleans where the title of my presentation was "Assessing the Wave Energy Potential of Jamaica, a Greater Antilles Island, through Dynamic Modelling".



Mario Eunick

Programme: MPhil in Applied Physics
Field of Study: Wireless Signal Propagation
Supervisor: Dr. Louis-Ray Harris

I received a BSc in Electronics Engineering (specializing in Telecommunications) in 2016, from the University of the West Indies, Mona. I have always been intrigued by wireless communication systems, so I decided to investigate wireless signal propagation in different environments at the graduate level.

My research involves the mapping and modelling of wireless fields in buildings with different materials and dimensions. I am also looking at how certain outdoor conditions affect indoor propagation for different building types and antenna designs at several frequencies. This is done by using software simulation tools as well as comparing simulation results with data obtained from probes. This approach differs from other propagation models in that it looks at specific building codes, whereas previous models used generic models.

My study aims to not only improve indoor signal propagation for existing building designs but also to get an understanding of how the signals would behave if the architecture were altered drastically. Improving indoor signal propagation may go a far way to reducing power consumption for large wireless networks as well as improving signal coverage in what are normally dead zones inside buildings.

Department of Physics

Adwalia Fevrier-Paul (BSc., MD)

Programme:	MPhil in Applied
Field of Study:	Medical Physics
Supervisor:	Dr. Adedamola K. Soyibo
Co-Supervisors:	Prof. Mitko Voutchkov; Dr. Sylvia Mitchell

My fascination with research started during the pursuit of a BSc. degree, double majoring in Microbiology and Physics. It was a love interest that persisted during medical school, propelling me towards the Medical Physics Programme at the UWI Mona. This programme is optimal for multi-disciplinary research, addressing public health concerns of global relevance.

With the exponential rise of diabetes and hypertension, investigation of non-traditional risk factors of these diseases, has provided evidence that chronic low- level environmental exposure to toxic elements, such as cadmium and lead, may cause or exacerbate kidney damage, as well as, increase the risk of end stage renal disease (ESRD). Additionally, essential trace elements, for example iron and zinc, often become deranged during haemodialysis, which is the main therapy for ESRD in Jamaica. Other less known or monitored elements, such as strontium and vanadium, have minor but clinically relevant roles in metabolism and are also affected. Because the kidney plays a central role in fluid and acid base balance, metabolic waste removal, bone health and hormonal regulation in the body, poor function causes multiple health complications with very negative outcomes.

Presently, my research in trace elemental patterns in ESRD allows me to construct an elemental profile for haemodialysis patients. As a recipient of the UWI Graduate Scholarship and Caricom-Canadian Leadership Scholarship, I have been motivated to collaborate with the University of Ottawa to perform multi-elemental analysis using the blood and urine of ESRD patients. My research has also been well supported by the Research and Publication grants received from the Office of Graduate Studies and Research at the UWI Mona.

My objective is to improve the understanding of elemental trends in kidney disease for both patients and medical professionals. Inevitably, relating elemental patterns to negative outcomes of kidney disease will create avenues for better management and treatment of kidney disease.

Sheldon Grant

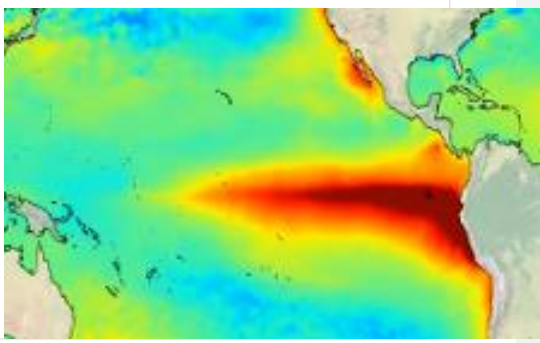
Programme:	MPhil in Physics
Field of Study:	Climate Studies (Seasonal Rainfall Forecasting)
Supervisor:	Dr. Tannecia Stephenson
Co-Supervisor:	Prof. Michael Taylor

I received my BSc degree in Physics from the University of the West Indies, Mona. I continued my studies within the Department of Physics in 2015 and is currently pursuing an MPhil degree in Physics. Working with Dr. Tannecia Stephenson, in the initial stage I completed a comprehensive assessment of the existing seasonal forecasting skill done locally during which three widely known skill scores were used: namely, Heidke Skill Score (HSS), Ranked Probability Skill Score (RPSS) and Relative Operating Characteristic (ROC).

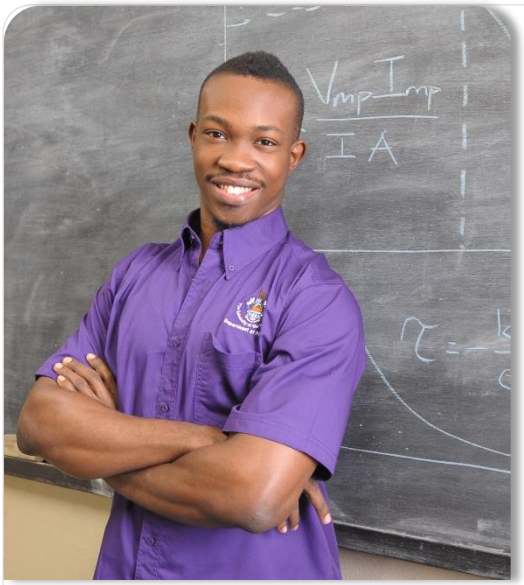
Rainfall is vital to the a number of sectors in Jamaica and improving the predictability of rainfall up to three months in advance would improve planning, water management and security. Another function of seasonal rainfall predictability would be a definition of the beginning of the wet season within the Caribbean, and Jamaica in particular. Finding the explanation of its variability through the variability of large scale drivers, such as the El Nino Southern Oscillation, would clearly outline drought relief efforts especially for the beginning of the wet season.

I was accepted to complete this research as an intern at the Caribbean Institute of Meteorology and Hydrology during which it was ascertained that ENSO does indeed influence the temporal distribution of the beginning of the wet season within the Caribbean.

The data generated from this project will assist in developing a statistical predictability model geared towards improving seasonal rainfall forecasting skill and wet season onset days.



Department of Physics



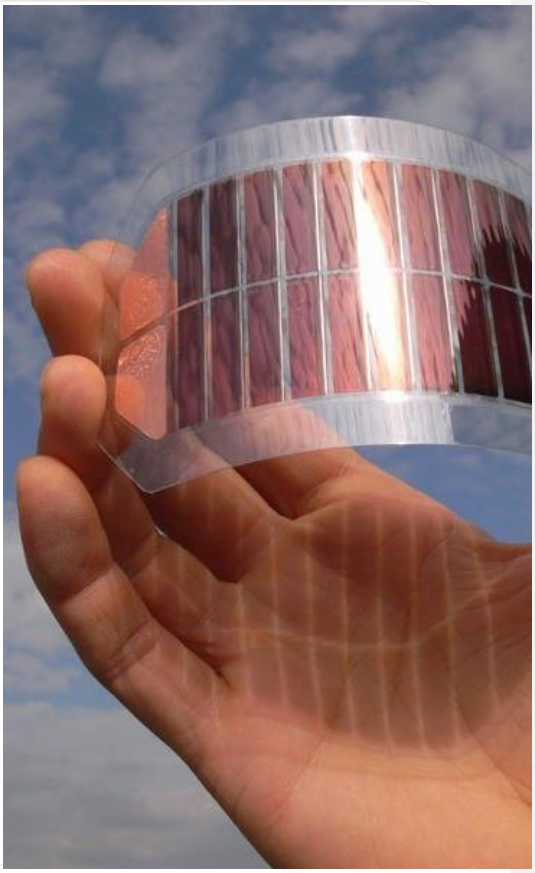
Leaford Nathan Henderson

Programme: MPhil in Physics
Field of Study: Materials Science/Renewable Energy
Supervisor: Dr. Marhoun Ferhat

I completed my undergraduate studies at the University of the West Indies, Mona, receiving a BSc. with majors in Physics and Chemistry in 2012.

My research interests primarily lie in the field of renewable energy generation and storage, and my MPhil project (currently supervised by Dr. Marhoun Ferhat) investigates the effect that three selected rare-earth dopants produce on the transport of electrical charge in the Dye-Sensitized Solar Cell, or DSSC. DSSCs are a type of hybrid photovoltaic device with a layered, heterogeneous materials structure; our research investigates how the addition of each dopant, over a specific range, affects the power production of the cell, as characterized by standard photovoltaic and electrochemical performance factor and techniques.

Results from the study have been presented at the Jamaica Institute of Engineers *Engineering Week Conference* (2014) and the *International Conference on Chemical and Materials Engineering* (Havana, Cuba, 2017).



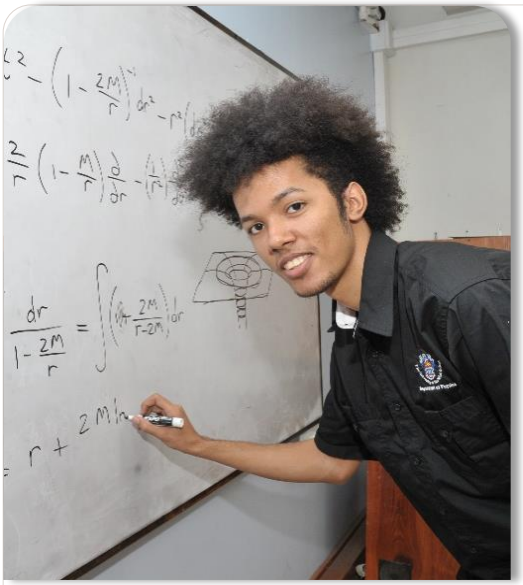
Craig Rattray

Programme: MPhil in Physics
Field of Study: Solar Tracking System Design
Supervisor: Dr. Kert Edward
Co-Supervisor: Dr. Marhoun Ferhat

I am the recipient of a Bachelor of Engineering Degree in Electrical Engineering from the University of Technology, Jamaica. I am currently pursuing a Master of Philosophy in Physics which involves the design of a novel image-based closed loop single-axis (azimuth) solar photo-voltaic tracker predicated on maximum intensity mapping. This research design presents an economically viable alternative that is unaffected by the presence of clouds; a phenomenon that is the primary cause of inaccurate tracking in other sensing technologies.

A US$2,782.76 grant was received to aid research efforts towards the modification of a solar tracking system at Jamaica House through a partnership with New Leaf Power & Conservation Solutions Limited. This research uses a low cost web camera (firmly affixed to a non-active region of a photovoltaic module and used to capture real-time images of the sky) in combination with a Raspberry Pi micro-computer and a linear actuator. A simple algorithm was developed using maximum intensity mapping to identify the sun, extract its indices and transmit a control signal to the actuator which changes the system's orientation to align the sun's centre with the image's centre-column pixel every 15 minutes. By minimizing parasitic energy consumption, this approach targets a performance enhancement equivalent to 15% - 30% more energy yield than similar fixed polar-mount systems.

Department of Physics



Karlus Redway

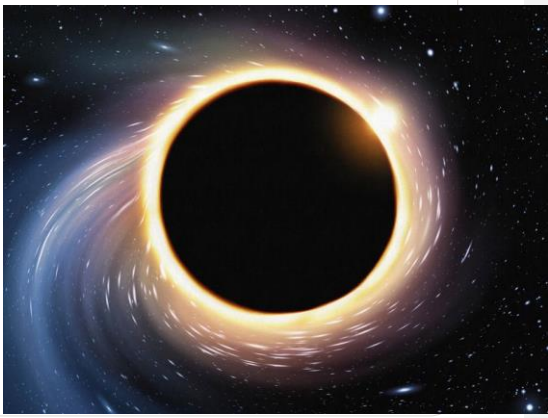
Programme: MPhil in Physics
Field of Study: General Relativity
Supervisor: Dr. Venkateswara Penugonda (UWI, Mona)
Co-Supervisor: Dr. Davide Batic (Khalifa University, Abu Dhabi, UAE)

My love for both the fields of mathematics and physics lead me to complete a BSc with a double major in Mathematics and Physics. I found what I believe to be one of the most elegant marriages of the two subjects in General Relativity and Black Hole physics.

For my MPhil I have been awarded the UWI Graduate Scholarship and I am under the guidance and supervision of Dr. Penugonda and my off-campus supervisor Dr. Batic, who is an expert in the field of General Relativity.

My research, which focuses on the quasi-normal modes calculations of noncommutative geometry inspired black hole solutions, is relevant in connection with the recent discovery of Gravitational waves for which the 2017 Nobel Prize in physics has been awarded. The quasi-normal frequencies of black holes have, encoded within them, the basic properties of the black hole including its mass, charge and angular momentum. Hence they serve as an excellent tie between the theoretical predictions of some types of black holes and the experimental detection of these astrophysical objects within the cosmos. The non-commutative geometry inspiration of the solution allows for us to cure the unpleasant singularity which naturally exists at the centre of every classical black hole solution.

Beyond the MPhil, I aspire to continue studying mathematical physics and work on answering the fundamental questions about how the universe we live in works.



Theodore Wynter

Programme: MPhil in Applied Physics
Field of Study: Materials Science (Thermoelectricity)
Supervisor: Dr. Marhoun Ferhat

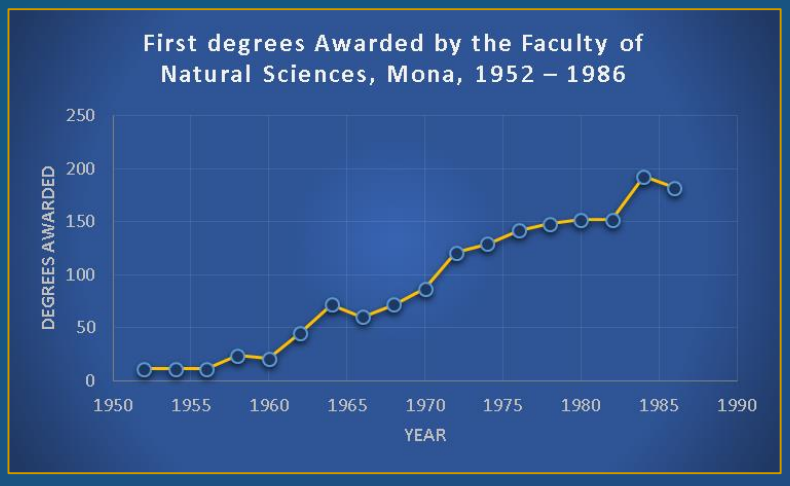
At the undergraduate level, I pursued a BSc degree majoring in Medical Physics and minoring in Computer Science offered by the University of the West Indies, Mona campus. Here I did a wide variety of courses from all Physics majors which gave me a wide variety of options to choose from at graduate school. I am currently pursuing a MPhil degree at the said University.

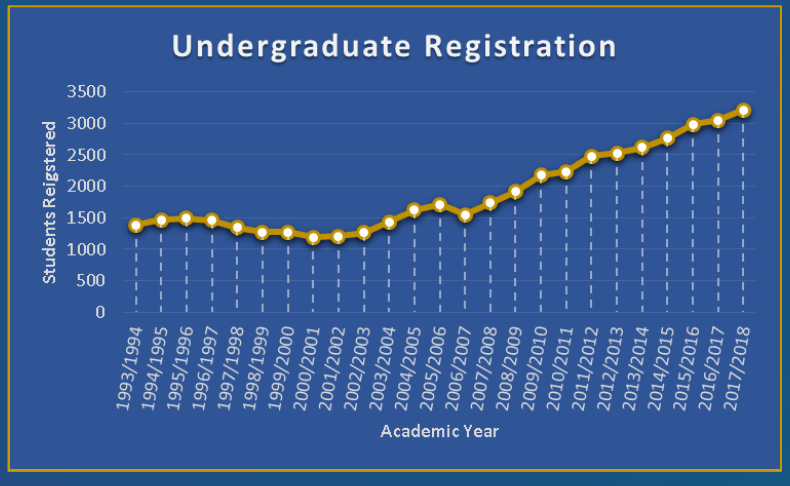
For my thesis I am carrying out a first principle study of the thermoelectric properties of metal chalcogenides. My research entails carrying out simulations of different metal chalcogenides and performing various calculations on the materials, within the Density Functional Theory, yielding information about or relating to the thermoelectric behaviour of that material. This field of study has many useful applications, one of which is the provision of "clean" energy.

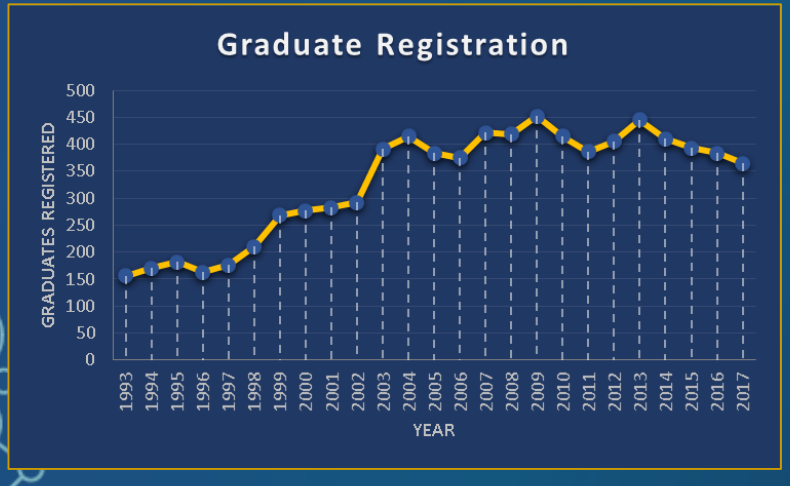
The Energy demand on the Earth is growing rapidly as time progresses, particularly, the need for "clean" sources of energy is increasing. Thermoelectricity can play a major role here, as it is the direct conversion of heat into electricity and electricity into heat. This conversion process does not involve any greenhouse emissions or emissions of any other harmful chemicals within the environment. The greater the thermoelectric performance of a material, the more efficient it'll be at meeting various energy demands on different scales. In addition, a lot of the energy produced from conventional methods is lost in heat. As such, waste heat recovery is also a viable market for thermoelectricity. If most of this lost heat is recovered, that would also be a significant achievement.

Another application comes up in the region of electronic refrigeration. Presently, the refrigeration process is done using a refrigerant, that passes through different phases to provide cooling. Thermoelectric devices can eliminate the use of these refrigerants and provide solid-state cooling (or heating) which boasts no movable parts amongst other advantages.

GROWTH OF THE FACULTY







Thank You

From Miriam E. Lindo, Chairperson

To Members of The FST Magazine Committee

I wish to express my sincere thanks to the members of the Magazine Committee who have greatly contributed their time and efforts into making the FST Magazine a reality. Everyone played their part with much enthusiasm and commitment.

Special thanks to **Mrs. Sabraham Green Smith** who took on the challenge of arranging the photograph sessions for the graduate students in the various Departments. This could have easily been considered the most troublesome aspect of the exercise; however, her experience coupled with her exceptional customer service persona was quite an encouragement and ultimately resulted in 85% of the graduate students participating in the exercise.

Dr. Curtis-Busby Earle and **Dr. Dwight Robinson** Lecturer and Head of Department respectively, who have given keen advice in shaping the contents of the production.

To **Mrs. Tracia Johnson-Blair** who never missed a Committee meeting and among other things, spent hours at The UWI Archives to gather historical records of the Faculty.

Many thanks to the **Departmental Representatives** who have taken the time from their research and administrative duties to ensure that their Department and Centres were adequately represented.

A big Thank You to **Miss Claudia Lewis;** your tireless efforts in designing the layout of this Magazine speaks volume of the competitive niche market that you have personally developed. We the members of the Committee salute you.

Mr Aston Spaulding the official and professional photographer has been with us from the first publication to capture theses precious moments in time. We thank him for his patience and assistance in keeping our heads straight.

Blessings to you all.

Mrs. Miriam Lindo – Chairperson

Mrs. Sabraham Green-Smith – Faculty Office

Magazine Committee

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Dr. Curtis Busby-Earle – Computing
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Mr. Marcel Denny – Chemistry
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NOTES

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FACULTY OF SCIENCE & TECHNOLOGY

2018