

DEPARTMENT OF LIFE SCIENCES



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Head of Department

WORK OF THE DEPARTMENT

Building on the action plan generated in response to the Quality Assurance review of the Department, done in 2016, the 2017–2022 strategic plan was developed during 2017/2018 and its implementation initiated; the focus was on 7 core areas: research and innovation; teaching, learning and student development; finance; employee engagement and development; internal operational processes; optimization and improvement of the physical plant; and outreach. Activities during the academic year centred on the implementation of critical areas of the plan with a view to achieving key strategic goals. A highlight of the year was the Department's participation in the successful staging of the 11th Faculty of Science and Technology Conference in April, 2018. Our students and faculty members were involved in 14 oral and 11 poster presentations. During the year, collaborative partnerships were explored with Queen's University, Kingston (Ontario, Canada); the Smithsonian Institution (Washington DC) and

the Fort Worth Zoo (Texas). Guests of the Department: Stephen C. Loughheed, Professor of Biology & Environmental Studies, Baillie Family Chair in Conservation Biology, and Director of the Queen's University Biological Station and Lichenologists, Joel Mercado from the Field Museum (Chicago, Illinois) and Dr. Manuela Dal Forno from the Smithsonian Institution.

Workshops/Meetings

During the year, 24 staff members participated in national and international workshops and meetings including: the National Forest Management and Conservation Plan Performance Monitoring, Evaluation and Reporting (PMER) Framework Workshop; a Symposium on Small Island Developing States (SIDS) in Tokyo, Japan; the UN Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES) in Colombia; the National Oceanic and Atmospheric Administration (NOAA) in North Carolina, USA; the GBIF Stakeholders' Consultation Workshop; the 1st Coral (Micro-fragmentation) Restoration Workshop at Mote Centre for Coral Reef Research & Restoration in Summerland Key, Florida, USA; the "Climate Change Capacity Building for GEF-SGP, NGOs and CBOs" workshop; the Organization of Eastern Caribbean States (OECS) – Marine Data Management Workshop for the Caribbean Region in St. Lucia; the 7th Global Workshop of the Agricultural Model Intercomparison and Improvement Project in Costa Rica; and the 101st Annual Meeting of the Florida Entomological Society in Florida, USA.

Post-Labour Day Project

Another Work Day was held on May 30, 2018 and was supported by staff and postgraduate students. Activities included the painting of the walls (facing the Spine) of the Biology Lecture Theatre, Block B and Blocks D and E.

STAFF MATTERS

Prof. Mona Webber was invited by the United Nations Development Programme (UNDP) to join the Technical Working Group for the Technical Support to Eligible Parties to Produce the Sixth National Report to the Convention on Biological Diversity (CBD) Project while Prof. Nouredine Benkeblia was appointed Review Editor for the report by the Intergovernmental Panel on Climate Change (IPCC).

At the 2018 Faculty Awards Ceremony, Mr. Pedrito Smith of the Discovery Bay Marine Laboratory (DBML) was selected as the Most Outstanding Worker for 2017 (MONATS category) based on his outstanding performance over the year. Four members of staff were recognized for their long service to the UWI on December 14, 2017: Mr. Ralbert Dowman and Mr. Camilo Trench for 15 years, Dr. Eric Hyslop for 21 years and Mr. Walton Reid (Electronic Microscopy Unit) for 40 years.

GRADUATE MATTERS

Three PhD candidates successfully defended their theses while two MPhil candidates successfully upgraded to the PhD programme. A total of 14 graduate students were awarded higher degrees at the November 3, 2017 UWI Mona graduation ceremony (2-PhD in Botany - Denneko Luke and Machel Emmanuel); 6-MSc in Agricultural Entrepreneurship; 5-MSc in Natural Resource Management: MaTE; 1-MSc in Plant Production and Protection). Graduate students had actively participated in the 11th Faculty of Science and Technology Conference, with 11 oral and 9 poster presentations. Ameka Myrie, investigating infestations of the Coffee Berry Borer, won the Best Poster award.

UNDERGRADUATE MATTERS

In total, 766 students were registered in undergraduate programmes during 2017/18, a 9% decline when compared to 2016/2017 which was largely due to the decline in student registration at Level 1.

In order to improve the experience of our undergraduate students, additional support was given to the Biology Students Association (BSA) to increase their student involvement activities. Special academic counseling sessions, discussion groups and stimulating field trips were added to their activities calendar.

Prizes Awarded

- Preliminary Biology, Don Skelding Prize: Gabrielle White
- 1st year Biology, Charlotte Goodbody Prize: Shantay Robinson
- Plant Diversity, Devi Prasad Prize: Shinell Gordon
- Animal Diversity, Avinash Potluri Prize: Shinell Gordon
- Plant Form, Sasikala Potluri Prize: Shakira Leslie
- Plant Physiology, Lloyd Coke Prize: Abimbola Ogunnowo-Haughton
- 2nd year Zoology, Vincent Hugh McKie Prize: Bianca Gittens
- Best 2nd year in Marine Biology Major, Ivan Goodbody Prize: Kayann Boucher

Approximately 61 students completed the requirements for majors or programmes in Life Sciences. One student (Ms. Ramona Jaggon) graduated with First Class Honours.

OUTREACH

The Department increased its outreach activities during the reporting period. Members of the BSA, the Port Royal Marine Lab and the Discovery Bay Marine Lab participated in the International Coastal Clean-Up Day, September 16, 2017 removing approximately 30 jumbo bags of plastic bottles and over 10 jumbo bags of regular garbage from the targeted coastal areas. This was followed on February 2, 2018 by a collaborative effort with the National Environment & Planning Agency (NEPA), in observance of World Wetlands Day, with a 'Coastal Cleanup and Mangrove Planting Activity' at the National Works Agency Mangrove Rehabilitation sites at Gypsum Wharf and near Gun Boat Beach along the Palisadoes.

The doors of the Herbarium and Animal Museum in the Department were opened to visitors from primary and secondary schools across Jamaica as well as a few international visitors. On the invitation of 3 preparatory schools and 4 high schools, members of the Department visited and made special presentations to their science and environmental clubs. As part of the Faculty's outreach efforts, the Department visited and interacting with students from over 20 high schools across Jamaica. On November 12, we joined the rest of the Faculty for the CB Group UWI 5K Run/Walk; staff and students participated as well as manned the FST booth at the event. We also participated, for the first time, in the Faculty's CAPE workshops, held in January 2018 at the Mona and Western Jamaica Campuses. February 2018 saw the staging of another well-received UWI Research Days showing from the Department (CMS/DBML/DLS/PRML) with displays on the Spine and in the Main Tent. As usual the marine animals were the "stars of the show" followed by the Cannabis research display on the Spine. In June, we joined the Relay for Life cancer outreach with staff and students completing multiple laps and manning the FST booth.

The PRML and DBML hosted their annual summer Marine Mania Camp and Eco-camp, respectively, with an overall total of 180 campers. The DBML camps received several participants through scholarships awarded to students from the Discovery Bay All Age School (the first adoptees of the DBML- Adopt-a-School programme) by the Lab as well as by members of the Fortlands Road community in Discovery Bay.

Mr. Camilo Trench (DBML) led a series of 'Hyperbaric Medicine in Jamaica' workshops, funded by a grant from the Tourism Enhancement Fund (TEF), for Jamaica's medical personnel. Workshops were held in December 2017 for the North-East Regional Health Authority (NERHA), engaging 32 hospital personnel and April 2018 for the South-East Regional Health Authority (SERHA), engaging 30 personnel.

Mr. Peter Gayle, with Mrs. Deana Lee Smith, assisted the ALLOA Discovery Bay Fishers Association (ADBFA) NGO to acquire a US\$44,500 (J\$5,696,000) grant in January 2018 from the Global Environmental

Foundation – Small Grants Program to ‘Evaluate Discovery Bay Inshore Coastal Water Quality in an effort to Improve Capacity for Environmental Management’.

Port Royal Marine Laboratory (PRML)

During the year the PRML hosted 1385 visitors, including students from six primary schools, 15 high schools, three colleges and three universities.

An MoU was signed between The UWI and Kingston Freeport Terminal Limited (KFTL) under which KFTL will provide US\$100,000 for the ‘Coral Reef Rehabilitation of the Port Royal Cays’. A project agreement valued at US\$15,000 was also signed with USAID to support activities towards ‘Sustainable Fishing in Kingston Harbour’. As part of this project, PRML in association with the US Embassy and Department of State held a Sustainable Fishers Workshop April 23–27, 2018 for 145 fisherfolk from the fishing communities associated with the Kingston Harbour: Hunt’s Bay, Greenwich Town, Rae Town, Rockfort and Port Royal. PRML hosted and participated in the Global Coral Reef Monitoring Network (GCRMN) Caribbean training workshop with participants and facilitators from across the Caribbean region. The PRML also hosted a stakeholder meeting for Kingston Harbour and Portland Bight Hydrographic Surveys and a video shoot in the Mangroves for Sustainable Development Goals of Jamaica (PIOJ).

The PRML continued to provide support to the NEPA-coordinated Iguana Conservation Project, the CMS–ICENS Microplastics Project and the CMS–KFTL Refuge Cay Rehabilitation Project. As part of the CMS/PRML/KFTL Refuge Cay Clean-up Project, completed with assistance from over 23 fishers from Port Royal, more than 8200 bags of garbage were removed from Refuge Cay and a boom/solid waste screen deployed to control the amount of garbage accumulating on the cay.

A significant achievement at PRML is that 59% of their energy needs is now generated from the Lab’s alternative energy systems. A new compressor facility was installed to support the increase in scuba diving research activities at the PRML.

Centre for Marine Sciences (CMS)

The CMS, with the DBML, continued to achieve its mission of engaging in research, training and outreach in Caribbean Marine Sciences. Over the reporting period, the Centre received a total of 3864 visitors: 251 overseas students and researchers, 387 from the UWI (incl. student researchers) and 3226 from other local institutions. DBML/CMS staff and students conducted research on over 14 projects, including: ‘Ecoreef’ (Noranda Bauxite); Mangrove Mitigation, Lionfish (Sandals); Critical Coastal Forest Rehabilitation, Northern Limestone Forest Conservation (FCF); Refuge Cay Clean-up and Mangrove Rehabilitation, Kingston Harbour Microplastics Assessment (KFTL); Assessment and Economic Valuation of Coastal Protection Services Provided by Mangroves in Jamaica (World Bank Program on Forests), Capacity Building for Biodiversity Data Sharing (Global Biodiversity Information Facility) through the Caribbean Coastal Data Centre, Jamaica and Discovery Bay Water Pollution Monitoring and Mitigation (GEF-SGP).

In April 2018, the 50th Anniversary of the Discovery Bay Marine Laboratory (at its current location) was celebrated through a week of activities (April 22–28). Activities commenced with a church service and brunch (at which the UWI Chancellor, Mr Robert Bermudez officially opened the week of celebrations) and culminated in an awards ceremony at which tributes were paid to the following persons:

Past Directors – For serving the DBML with distinction (as Director, Centre for Marine Sciences): Dr. Jeremy Woodley (1975–2000); Dr. Ian Sandeman (1992/3; 1995); Dr. George Warner (2000–2005); Dr Dale Webber (2005–2015).

Overseas Groups: Many universities have used the DBML over the years (with peak years having as many as 32 visiting groups), however, the following have been outstanding for the period: Coastal Carolina University (1987–present); Martin Luther College (1995–present); Wisconsin Lutheran College(1995–present); The University of Edinburgh (1st in 2000; 2002–present); Stony Brook University (2006–present).

Benefactors: The DBML has benefitted from various corporate and medical personnel who have given tremendous assistance in many instances going above and beyond the call of duty. Noranda Bauxite Bauxite Partners II (Bauxite Companies assisting from 1965); Dr. Fiona Pinnock (Hyperbaric Chamber Physician –20 years); Dr. Clifton Hector and Dr Ronnie leMercier duQuesnay (1st Hyperbaric Chamber Physicians).

Long Service: Staff who have given over 10 years of distinguished service. Peter Gayle, Scientific Officer (1985–present); Lorna “Precious” Brown, Housekeeper (1986–present); Pamela Housen, Administrative Officer (2004–present); Patrick “Harry” Edwards, Handyman and Gardener (2005–present).

For the reporting period, the DBML hosted four interns from Jamaica, Trinidad, Japan (through the Japan International Cooperation Agency - JICA) and the United Kingdom (Plymouth University). A total of 10 fishers/technical divers reported to the Hyperbaric Treatment Facility for treatment of decompression sickness and 738 scientific/recreational/training dives occurred.

DBML further reduced its reliance on fossil fuels to 50% with the installation of an additional 20kWh photovoltaic system under the project “Establishing one raceway system for growing fragmented coral for ecosystem restoration with flowing water maintained by renewable energy” funded by the IDB-Special Climate Change Adaptation Fund and administered through the Environmental Foundation of Jamaica in collaboration with the Ministry of Economic Growth and Job Creation. An existing 10kW photovoltaic system was installed in 2015 through the United States Department of the Interior.

The UWI-CMS and Kingston Freeport Terminal Limited (KFTL) signed an MOU in August 2017 for mangrove forest rehabilitation on Refuge Cay in the Port Royal mangroves, Kingston Harbour. Under the agreement, CMS received US\$110,000 (J\$14,000,000) towards solid waste removal, hydrology restoration and mangrove seedlings re-planting on the cay. The UWI-CMS signed an MOA with Sandals in November 2017 which saw the provision of US\$22,695 (J\$2,700,750) to facilitate

the assessment and monitoring of seagrass communities at Whitehouse, south coast Jamaica. The CMS/ DBML received J\$3,242,000 in November 2017 through the Tourism Enhancement Fund toward maintenance of the hyperbaric chamber and to provide training for staff and health care sector workers in identifying the symptoms/ signs of decompression sickness.

PAPERS PRESENTED AT CONFERENCES

- **Brown, M.D.**, Lindo, J.F. and **Robinson, R.D.** (2017). Molecular epidemiology and phylogeography of *Angiostrongylus cantonensis* in northeastern Jamaica. International Conference on Parasitology. Bangkok, Thailand. November 24–25.
- **Trench, C., Webber, M.** and Palmer S. (2017). The effects of solid waste on mangrove propagule survival in Jamaica. IUCN-SSC Mangrove Specialist Group Symposium, organised and convened by Mangrove Ecology group, Leibniz-Centre for Marine Tropical Research (ZMT), Bremen, Germany. September 12–16.
- Rankine, D., **Cohen, J.**, Taylor, M., Coy, A., Stephenson, T. and R. Hall-Hanson. Modelling Sweet Potato Production under Climate Change - An Adaptation Option for the Caribbean. Caribbean Climate Change Conference. CCCCC and EU GCCA+, Port of Spain, Trinidad & Tobago, October, 10–12.
- **Emanuel, M. A.** and **Robinson, D. E.** (2017). The nostalgic value of Jamaica's landrace *Cannabis sativa* genetics. *26th Annual Research Conference and Workshop – Cannabis and Cannabinoids: Research, Opportunities and Challenges*. Faculty of Medical Science, The UWI, Mona, Kingston. November 8–10.
- D.R. Rankine, **Cohen, J.E.**, Lallo, C.H.O., Taylor, M.A., Campbell, J. and T.S. Stephenson. (2018). Caribbean Food Security – The Future of Livestock in a Warmer Climate. European Geosciences Union General Assembly, Vienna, Austria. April 8–13. Poster.
- Buddo, D., von Habsburg, F., **Webber, M., Palmer, S., Aiken, K.**, Reymann, M., **Kyne, F.**, Donegan, F., **Henry, D.** and D. Kyne

- (2018). Science, Art and Community: A Collaborative Approach to Protecting Fish Stocks. 11th Conference of the Faculty of Science and Technology. Mona, Kingston, April 25–27. Oral.
- Charpentier, B.H. and **Gayle, P.M.H.** (2018). Using photogrammetry and three-dimensional (3D) modelling for measuring coral growth and mapping coral reef habitats. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Oral.
 - **Creary Ford, M.** (2018). Increased sea surface temperature on a Jamaican coral reef during the 2015–2016 mass bleaching event in the northern Caribbean. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Oral.
 - **Chin, D.** and **Aiken, K.** (2018). Solving the lionfish problem through research and innovation. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Oral.
 - **Trench, C.** (2018). Development of effective mangrove rehabilitation methods for Jamaica. 11th conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Oral.
 - **Williams, T., Emmanuel, M., and Robinson, D.E.** (2018). Phytophagous insects associated with the outdoor cultivation of *Cannabis sativa* at The University of the West Indies, Mona Campus. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Oral.
 - **Oliphant, Z.** and **Hyslop, E.J.** (2018). Lentic Habitats in Jamaica: Productivity and Predator-Prey Interactions within the Macroinvertebrate Community. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Oral.
 - **Campbell, G., Garraway, E.** and **Hyslop, E.J.** (2018). An Assessment of Jamaican Cave Fauna. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Oral.

- **Bowman, T.** (2018). Assessing Composition, mapping distribution and examining resource partitioning in the fish community of Salt River (a saline lotic system). 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Oral.
- **Goodwin, S.** and **Hyslop, E.J.** (2018). A study of the benthic macroinvertebrate fauna of high altitude rivers in central Jamaica. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Oral.
- **Neath, D.** (2018). A glimpse into the Genetic Variation of Three Armyworm Species, *Spodoptera exigua*, *Spodoptera latifascia* and *Spodoptera frugiperda* in Jamaica. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Oral.
- **Coore, K., Palmer, S.** and Gordon-Smith, D. (2018). Coral Reef Health and Water Quality of the Port Royal Cays, Jamaica. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Oral.
- **Stephenson, K., Taylor, M.** and **Wilson, B.** (2018). Using Generalized Linear Mixed Modelling to Project Faunal Abundance in a Caribbean Dry Forest Under Climate Change. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Oral.
- **Franklin, T.L.** and **Hyslop, E.J.** (2018). The effect of variations in salinity on the composition of the benthic macroinvertebrate community of Salt River, Clarendon, Jamaica. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Poster.
- **Miller, T.L.** and **Hyslop, E.J.** (2018). The effect of thermal water inflow from Bath Springs on the faunal composition and distribution of benthic macroinvertebrates (BMI) in Sulphur River, St Thomas, Jamaica. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Poster.

- **Colquhoun, D.S. and Webber, M.K.** (2018). The use of the physicochemical and planktonic indices in selecting ideal areas in east Portland, Jamaica as Special Fishery Conservation Areas (SFCAs). 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Poster.
- **Duscent, C.K. and Hyslop, E.J.** (2018). An assessment of the Biology and Ecology of *Sicydium* spp. (Family Gobiidae) from Yallahs and Swift Rivers, Jamaica. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Poster.
- **Myrie, A.N. and Robinson, D. E.** (2018). Activity and Infestation Levels of the Coffee Berry Borer, *Hypothenemus hampei* (Ferrari) (Coleoptera: Curculionidae) in the Highlands and Blue Mountains of Jamaica. 11th conference of the Faculty of Science and Technology. Mona, Kingston, April 25–27, 2018. Poster.
- **Gayle, P.** (2018). Novel Coral Restoration Methods at Discovery Bay, Jamaica. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Poster.
- **Whyte, D.L. and Garraway, E.** (2018). The use of camera trap technology for monitoring the behaviour of the invasive Indian mongoose as a component of invasive species management. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Poster.
- **Campbell, G. and Hyslop, E.J.** (2018). The ecology of temporary ponds at UWI Mona, Kingston Jamaica. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Poster.
- **Commock, T.M.** (2018). Achievements along the way to updating the status of *Dendrocousinsia* – An endemic genus of Jamaica. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Poster.
- **Green, C., Small, H., Davis, S., Palmer, S.E.** (2018). The Role of the UWI Port Royal Marine Laboratory in National Environmental

Education. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Poster.

- Coates, K., Gordon-Smith, D., Burn, M., Smol, J. and **Palmer, S.** (2018). Sedimentary Records of Anthropogenic Impacts and Climate Variability from a Tropical, Urban Estuary: A 150-Year Palaeoenvironmental Reconstruction of Kingston Harbour, Jamaica. 11th Conference of the Faculty of Science and Technology. The UWI, Mona, Kingston, April 25–27. Poster.
- Rankine, D., **Cohen, J.**, Taylor, M., Coy, A. and Stephenson, T. (2018). Modeling Drought Tolerance in Caribbean Root Crops under Present and Future Climates – the Case of Jamaican Sweet Potato. 7th Global Workshop Agricultural Model Intercomparison and Improvement Project, April 24–26. San Jose, Costa Rica. Poster.
- Ross-Davis, A.L., Gra a R., Peever T., Hanna J., Uchida J., Hauff R., Kadooka C., Kim M-S., Cannon P., Namba S., Simeto S., Pérez C., Rayamajhi M., Morán M., Lodge D., Arguedas M., Medel-Ortiz R., López-Ramírez M., **Tennant P.**, Glen M., McTaggart A. and Klopfenstein N. (2018). Genetic and genotypic diversity of *Puccinia psidii*- the cause of guava/eucalypt/myrtle rust and preliminary predictions of global areas at risk. pp. 184–93. In: A Schoettle, R Sniezko, J Kliejunas (Eds). Proceedings of the IUFRO joint conference: Genetics of five-needle pines, rusts of forest trees, and Strobosphere, June 15–20. Fort Collins, CO. Proc. RMRS-P-76. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- **Robinson, D. E.** and **McDonald, N.:** Invasive Pests and their Management: The Jamaican Perspective. Symposium entitled “Regulatory Aspects of Invasive Species Management” at the 101st Annual Meeting of the Florida Entomological Society, St. Augustine, Florida, USA. July 22–25.
- **Coore, K.** and **Palmer, S. E.** 2018. The importance of water quality in a coral reef health assessment of the Port Royal Cays, Jamaica. Latin America and Caribbean Congress for Conservation Biology. St. Augustine, Trinidad and Tobago. July 25–27.

PUBLICATIONS

Books, Book chapters & Monographs

- **Benkeblia, N.** (2017). *Phytonutrients and Crops Improvement*. Wiley & Sons Publisher, Chichester, UK, 544 p.
- Santos, C., **Benkeblia, N.** and Vasconcelos, M. (2017). High-throughput phenotyping: a modern tool for enhanced phytonutrient content. In: *Phytonutritional Improvement of Crops*. N. Benkeblia (Ed.). Wiley & Sons, Chichester, UK, pp. 203–232.
- **Benkeblia, N.** (2017). *Phytonutrients Improvement of Sweetpotato*. In: *Phytonutritional Improvement of Crops*. N. Benkeblia (Ed.). Wiley & Sons, Chichester, UK, pp. 391–406.
- **Benkeblia, N.** (2017). Chromatographic techniques of mono- and di-saccharides analysis. In: *Carbohydrates in food*. A-C. Eliasson (Ed.). CRC Press, Boca Raton (FL), pp. 1–36.
- **Emanuel, M.** (2017). Ackee (*Blighia sapida* Koenig). In: *Fruit and Vegetable Phytochemicals: Chemistry and Human Health*, Second Edition. E. M. Yahia (Ed.). Wiley & Sons, Ltd. Pp. 859-868.
- Greenaway, A.G., **Robinson, R.D.**, Grizzle, E. et al. (2017). Standards for the Sciences. The University Council of Jamaica.
- **Benkeblia, N.** (2018). Harnessing the nutritional and commercial benefits of jackfruit (*Artocarpus heterophyllus*) in the tropics and subtropics. In: *Agriculture, Food, and Food Security: Some Contemporary Global Issues*. C. L. Beckford (Ed.). Nova Science Publisher, Hauppauge (NY), pp. 1–28.
- **Benkeblia, N.** (2018). Unlocking the full potential of carambola (*Averrhoa carambola*) as a food source: botany, growing, physiology and postharvest technology. In: *Agriculture, Food, and Food Security: Some Contemporary Global Issues*. C. L. Beckford (Ed.). Nova Science Publisher, Hauppauge (NY), pp. 131–158.
- **Tennant, P.**, Fermin, G. and Foster, J. (2018). *Viruses: Molecular Biology, Host Interactions and Applications to Biotechnology*. Academic Press. 392 pp.

- Henry, A., Webber, D. and **Webber, M.** (2018). “Rapid Assessment Methods Developed for the Mangrove Forest of the Great Morass, St Thomas, and Eastern Jamaica”. In: *Wetland and stream assessment*, J. Dorney, R. Savage, R. Tiner and P. Adamus (Eds.). Elsevier Inc. <https://doi.org/10.1016/B978-0-12-805091-0.00005-0>. pp. 529–538.
- **Webber, M.**, Webber, D., Townsend, S. and **Persad Ford, G.** (2018). Plankton Ecology and Productivity in Jamaican waters; new and unique applications. In: *Plankton Ecology and Productivity*, Muhammet Türko lu, Umur Önal and Ali Ismen (Eds.). INTECH, Open Science Publishers. pp. 73–97.
- *Refereed Journal Articles*
- **Benkeblia, N.** and Beaudry, R.M. (2018). Effects of temperature on postharvest respiratory parameters and quality attributes of ackee (*Blighia sapida* Köenig) fruit arils during storage. *International Food Research Journal* 25(1): 119–126.
- Chollett, I., R. Collin, C. Bastidas, A. Croquer, **P.M.H. Gayle**, E. Jordan-Dahlgren, K. Koltes, H. Oxenford, A. Rodriguez-Ramirez, E. Weil, J. Alemu, D. Bone, K. C. Buchan, **M. Creary Ford**, E. Escalante-Mancera, J. Garzon-Ferreira, H. M. Guzman, B. Kjerfve, E. Klein, C. McCoy, A.C. Potts, F. Ruiz Renteria, S.R. Smith, J. Tschirky and J. Cortes. (2017). Widespread local chronic stressors in Caribbean coastal habitats. *PLoS ONE* 12(12): e0188564. <https://doi.org/10.1371/journal.pone.0188564>.
- **Commock, T., P.E. Rose**, K.N. Gandhi, **K.C. Campbell**, K.J. Wurdack, J. Francisco-Ortega and B. Jestrow (2017). Typification and nomenclature of five taxa endemic to Jamaica. *Harvard Papers in Botany*, 22 (2): 137–140.
- **Emanuel, M. A.**, Haughton A. Y. and K'nife K. A. H. (2018). Policy Analysis and implications of establishing the Caribbean Cannabis Economy CCE: Lessons from Jamaica. *Drugs and Alcohol Today* 18(2): 99–107.
- Franklin, J., Andrade, R., Daniels, M., Fairbairn, P., Fandino, M., Fondo, G., Thomas, W., González, G., Gonzalez, O., Imbert, D.,

- Kapos, V., Kelly, D., Marcano-Vega, H., Meléndez-Ackerman, E., **McLaren, K.**, McDonald, M., Ripplinger, J., Rojas-Sandoval, J., Ross, M., Ruiz, J., Steadman, D.W., Tanner, E., Terrill, I., Vennetier, M. (2018). Geographical ecology of dry forest tree communities in the *West Indies*. *Journal of Biogeography*, 45: 1168–1181.
- Griffin, A. H., J. C. Deboer, P. D. Campbell, **B. S. Wilson**, and A. M. Bauer. 2017. *Aristelliger praesignis* (Jamaican Croaking Lizard): maximum size. *Herpetological Review* 48:184–185.
 - Kitson-Walters, K., Candy, A.S., Truelove, N., Roye, M., Aiken, K., **Webber, M.** and Box, S. 2018. A Genetic Assessment of the Queen Conch in Jamaica's Exclusive Economic Zone. *Fisheries Research* 199: 53–62.
 - Lallo, C.H.O., **J. Cohen**, D. Rankine, M. Taylor, J. Campbell and T. Stephenson. (2018). "Characterizing Heat Stress on Livestock using the Temperature Humidity Index (THI) – Prospects for a warmer Caribbean. Regional Environmental Change. <https://doi.org/10.1007/s10113-018-1359-x>.
 - **Luke, D.** and **K.P. 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*, 89: 1–10.
 - McIntyre K., **K. McLaren** and **K. Prospere** (2018). Mapping shallow nearshore benthic features in a marine protected area in Jamaica: assessing the efficacy of using different data types (hydroacoustic versus satellite images) and classification techniques. *International Journal of Remote Sensing*, 39: 1117–1150.
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- Editor/Reviewer, International Panel on Climate Change (IPCC)
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- Member, Jamaica Conservation Partners (C.B. Facey Foundation)
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