

THE BIOTECHNOLOGY CENTRE



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Director

WORK OF THE CENTRE

The Biotechnology Centre started the 2013–2014 academic year with the appointment of Professor Helen Asemota as the new Director following Dr. Marcia Roye's three years as Acting Director, upon the retirement of the Founding Director, Professor M. Ahmad, in 2010. Professor Asemota who has led the Yam research group of the Biotechnology Centre from the early 1990s was appointed on secondment from the Department of Basic Medical Sciences. She is Professor of Biochemistry & Molecular Biology, a long standing academic staff of the University and an occasional International Consultant for Biotechnology with the United Nations FAO emergency services. The Centre holds monthly staff meeting to plan, discuss and review its activities.

During the year in question, research activities continued rigorously at the Centre, especially in the area of agro-based studies involving medicinal

plants, yams, moringa, forestry preservation, molecular virology, as well as study of begomoviruses and other viruses associated with citrus, potato, cucurbits and other crops. Biomedical research included investigations of the glycemic indices of Jamaican foods, including root and tuber crops, and commonly eaten snacks, in collaboration with the Scientific Research Council and the Basic Medical Sciences Department, and analyses of mechanism of action of supplements or secondary metabolites in animal model of diseases. Drug Abuse research was also pursued in collaboration with experts from the Psychiatry and Community Health Department, and Maryland, USA

The Centre's academic staff members were all involved in teaching undergraduate courses within the Department of Basic Medical Sciences, the FST and the Department of Life Sciences, as well as in the training and supervision of postgraduate students conducting research at the Centre. They were also involved in various outreach programmes, participating in public lectures and seminars, and in university meetings and activities such as the Western Jamaica Campus Open Day (January 13 and 14, 2014) and the Annual Research Day (February 19 to 21, 2014).

OUTREACH SERVICES

The Centre is assisting the Access and Benefit Sharing (ABS) initiative in the Caribbean for eventual ratification of the Nagoya Protocol. Dr. Mitchell has been designated as the UWI representative and serves the team as the Scientific Advisor. Established in 2006, the ABS Capacity Development Initiative is a multi-donor collaboration that aims to support African, Caribbean and Pacific countries in developing and implementing the 'Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity'. The Initiative is governed by three Regional Steering Committees, composed of governmental ABS experts from the region, donors and stakeholder representatives.

VISITORS TO THE CENTRE

The Centre received various UWI and local visitors during the year, from colleagues at both Mona and the St. Augustine Campus, the public and from the Caribbean Maritime Institute. Foreign visitors to the Centre included: a) Professor Moji Adeyeye, Head of the School of Pharmacy of the Roosevelt University, Illinois, USA, to discuss research collaboration. The collaboration set up resulted in the visit of a UWI postgraduate student of Professor Asemota, Sasha-Gay Wright to the laboratories of the School of Pharmacy at Roosevelt for a semester; b) Dr. Mathew Baker from Oxford University (now at the Chang Cardiac Research Institute in Australia) also visited to discuss nanotechnology collaboration possibilities; c) Dr. Kendra Merchant, Assistant Professor of Biology, at the Albany State University, GA, USA, an old student of the UWI.

NEW INITIATIVES

- The Centre created a proposal for Products Pre-commercialization (Pilot) Analysis Project, which received approval. The objectives include pilot study for the commercialization of the developed Biotech Value-added Products as well as the modified yam starch for pharmaceutical applications, as exhibited at the UWI 2014 Research Day by Prof. Asemota's research team. The pre-commercialization project invited the appointment of Dr. Alexia Harvey as a Research Fellow for the Project, effective August 1, 2014
- The Centre developed a "Way Forward Document" that was presented to the Faculty Board on Thursday May 8, 2014 by the Director. It includes plans to, among other things, effect: enhancement of agricultural research to support agro-based economic boost; transformation of biotech education to promote preparedness for insurgent bioeconomy; enhancement of community outreach through incubator programmes & bioservices; commercialization of existing sellable outputs through effective pre-commercialization studies; introduction of cultural biotechnology to highlight indigenous bio-based technologies; and

transformation through marketplace biotechnology to a Centre of Excellence in the tropical world for 'Plants propagation, pathology and value-added products development'. The Biotechnology Centre's Way Forward document was submitted to the Dean of the Faculty of Science and Technology in June 2014.

- In December 2013, the Biotechnology Centre Seminar Series was initiated, commencing with a presentation entitled "The Nagoya Protocol for Access and Benefit Sharing: Implications for Research and Development" by Dr. Sylvia Mitchell on December 16, 2013. The second seminar titled "Virus discovery, detection, diagnosis and characterization using small RNA deep sequencing" was by Dr. Marcia Roye on May 15, 2014. This was followed by a presentation by a visitor to the Biotechnology Centre, Dr. Matthew Baker of the Victor Chang Cardiac Research Institute in Australia, titled "Harnessing the Bionanotechnology Inside the 'salmonella speedboat': The artificial synthesis of the bacterial flagellar motor" on May 27, 2014. Dr. Baker's visit also gave support to the drafting of a bionanotechnology course. Dr. Kendra Merchant of the Albany State University, USA, a former UWI student of Prof. Asemota, was the fifth presenter in the Biotechnology Centre Seminar Series. Her seminar entitled "The use of Dietary Phytochemicals in the Treatment of Prostate Cancer" was on July 17, 2014. Electronic copies of the presentations are available at the Centre for interested persons. The Biotechnology Seminar Series was planned to include biotech business development presentations.
- Within the year, the Centre began a Biotech Incubation Programme with the help of the Mona Office for Research and Innovation (MORI) in collaboration with the UWI Business Initiative. The first intern of the Incubation Project is Mr. Jordan Freeman, a Biotechnology Student of the University, training to develop a biotech business within the sweet industry. He is supervised by Professor Asemota and Mr. Colin Webster of the UWI Business Initiative.
- The Centre participates in the Bureau of Standards 'Enterprise Jamaica' Initiative which is aimed at raising the standard of entrepreneurship in Jamaica. The Virtual Incubation Programme of this project will target

start-up businesses in a bid to steer them through the difficult early stages. The Biotechnology Centre will provide knowledge and advice for the Incubation programme's bio-technical dimensions. Mr. Jordan Freeman and Ms. Danielle De LaHaye were both enrolled by Dr. Sylvia Mitchell for participation in the "Enterprise Jamaica" Initiative.

THE 2014 DENBIGH SHOW EXHIBITIONS

The Centre participated in the 2014 Denbigh Agricultural Show. A number of medicinal plants (John Charles, Pimento, Lemon Grass etc.) and tissue culture plants (yams, pineapples, ginger, turmeric, sarsaparilla etc) were displayed. Moringa was specially featured at this event. A few products were available for taste, such as Moringa bars, yam spreads and juice. Moringa seeds, leaves, flowers, pods and plants were also displayed and literature provided to highlight the medicinal potency of the plant. Several Biotech Centre value-added products were displayed, the cheesy yam spread was chosen for television coverage. Other Biotech Products displayed included neem tea, John Charles and fever grass tea. Dr. Sylvia Mitchell coordinated the Denbigh Show on behalf of the Centre, facilitated by some postgraduate students of Professor Asemota – Racquel Wright, Kenroy Wallace and undergraduate research student Nikashae Scott (of both Professor Asemota & Dr. Mitchell), who are all co-inventors of products. The Biotechnology Centre-Denbigh Team partook in two promotional activities, a feature of the Moringa products on CVM on July 28th, and the feature on the yam spreads on 'Smile Jamaica', TVJ, on July 30th <http://www.televisionjamaica.com/Programmes/SmileJamaica.aspx/Videos/36652>). A lot of interest was received over the three days of the Denbigh Show for all of the Centre's products displayed. Notable scenes at the display included the Principal of UWI Mona, Professor Archibald McDonald and the Minister of Education, Ronald Thwaites, tasting the yam spreads and Moringa bars.

COLLABORATION

The Centre is collaborating with multiple Departments and Institutes of the University of the West Indies as well as with some Governmental

Agencies, private sectors, and foreign institutions. To mention a few, there is a new collaboration with NEPA on conservation of extreme species. There is ongoing collaboration with the Natural Products Institute to test for citrus greening (HLB disease) on some fifteen samples of four varieties of citrus plants and another with the Scientific Research Council on glycemic indices of Jamaican commonly eaten foods. A table of glycemic indices of commonly eaten foods has been prepared for use in health management efforts. With the Department of Life Sciences, the Centre is screening varieties of citrus plants for pathogens including psorosis, tatterleaf, and citrus tristeza virus, both mild and severe, among others. The Centre is also involved in a pimento project with the Life Sciences Department through Prof. Nouredine Benkeblia and has a leading from the Agro Investment Corporation. The research aims to develop biomarkers for male and female pimento plants using molecular techniques in order to know in advance which trees will bear fruits. The Project is supervised by both Professor Asemota and Prof. Bankeblia and includes Dr. Melaine Randle, the Centre's Senior Laboratory Technologist, in collaboration with Mr. Frederick Boyd of the Life Sciences Department. The Centre is in ongoing collaboration with the Basic Medical Sciences Department, the Chemical Pathology Section, the Sick Cell Unit and the Department of Chemistry. The Centre is also collaborating with the Ministry of Education in their current bid to transform education, in aspects that pertain to Biotechnology.

PAPERS PRESENTED AT CONFERENCES

- Mitchell S.A. (2014). "Innovative ways to successfully initiate tropical plant species including ginger (*Zingiber officinale*), turmeric (*Curcuma longa*), sarsaparilla and chainy root (*Smilax* spp), and yam (*Dioscorea* spp)". World Forum on Biology, Joint Meeting of the Society for In Vitro Biology and the Society for Cryobiology, Savannah, Georgia, USA, May 31–June 4th, 2014. Abstract P-31, In Vitro Cellular and Development Biology, Abstract Edition 50: S10.
- Picking D and Mitchell S.A. (2014). "The contemporary use of medicinal plants in Jamaica and in vitro assessment of potential

herb-drug interactions and chemopreventative properties of select plants”. 25th Mona Symposium on Natural Products and Medicinal Chemistry, January 6–9, UWI, Mona Campus.

- Mitchell S.A. (2013). “Value chains in Jamaica, from natural biodiversity to high-value products, and associate challenges in achieving benefits from these endeavours”. The 2nd Workshop of the Access and Benefit Sharing (ABS) Capacity Development Initiative, November 25–29, Kingston, Jamaica.
- Roye, M.E. (2013). Applications of high throughput sequencing: Viral diagnosis and characterization. Therapeutics and Functional Genomics, Society for Scientific Advance Second Annual Conference, Mona Visitors Lodge, UWI, Mona, Kingston, November 22, 2013.
- Ross-Davis, A, Graça, R, Alfenas A, Peever T, Hanna J, Uchida J, Hauff R, Kadooka C, Kim M, Cannon P, Namba S, Minato N, Simento S, Perez C, Rayamajhi M, Morán M, Lodge D, Arguedas M, Medel-Ortiz, R, López-Ramirez M, Tennant P, Glen M, Klopfenstein N. (2013). “Tracking the distribution of the pandemic *Puccinia psidii* genotypes”. Annual meeting of the American Phytopathological Association Austin, Texas, August 10–12.
- Roye, M.E. (2013). First Love (Geminivirus research in Jamaica), no love at all (HIV drug resistance in adults and children in Jamaica). CARISCINCE Conference and Annual General Meeting. Runaway Bay, St Ann Jamaica. (Plenary lecture), November 14–16.

PUBLICATIONS

Refereed Journals

- Dilworth LL, Brown KJ, Wright RJ, Oliver MS and Asemota HN “An assessment of bioactive compounds and antioxidants in some tropical legumes, seeds, fruits and spices”. *Journal of Research in Biology* 3,7 (2014): 1182–1194.
- Dewayne E. Stennett, Frederick Oladeinde, Andrew O. Wheatley,

Lowell L. Dilworth, Christine Hohmann, Joseph Bryant and Helen N. Asemota. "Evaluation of the effects of bitter yam tuber supplementation on serum parameters used to assess hepatotoxicity and nephrotoxicity in transgenic mice". *Journal of Bioscience and Biotechnology* 3,2 (2014): 133–139.

- Curtello, S., Vaillant, A. A. J., Asemota, H., Smikle, M. P., & Akpaka, P. E. "Salmonella Yeerongpilly in a Chinese Owl (*Columba livia domestica*) in Jamaica". *British Microbiology Research Journal* 4, 2 (2014) 167–172.
- Curtello, S., Vaillant, A. A. J., Asemota, H., Smikle, M. P., & Akpaka, P. E. "A DNA vaccine versus attenuated vaccine to protect against Salmonella infection in chickens". *British Journal of Medicine and Medical Research* 4, 3 (2014) 828–842.
- Curtello, S., Vaillant, A. A. J., Asemota, H., Akpaka, P. E., & Smikle, M. P. "Prevalence of Salmonella organisms in poultry and poultry environments in Jamaica". *British Microbiology Research Journal* 3, 4 (2013) 461–469.
- Asemota, H., Curtello, S., Vaillant, A. A. J., Mohammed, W., & Vuma, S. Purification of Avian IgY with Trichloroacetic Acid (TCA). *J Chromatograph Separat Techniq*, 4,205 (2013) 2.
- Curtello, S., Vaillant, A. A. J., Asemota, H., Akpaka, P. E., & Smikle, M. P. (2013). The Effectiveness of Antibiotics in the Prevention of Salmonella Typhimurium in Growing Chickens. *American Journal of Experimental Agriculture* 3, 4 (2013) 849–856.
- Dewayne Stennett, Frederick Oladeinde, Andrew Wheatley, Lowell Dilworth, Joseph Bryant, Helen Asemota. "Modulation of the antioxidant status of the hearts and brains of genetically modified hypercholesterolemic mice overproducing HDL cholesterol following acute bitter yam supplementation". *Oxidants and Antioxidants in Medical Science* 2, 1(2013):11–19.
- Green, C. O., Wheatley, A.O., McGrowder, D.A., Dilworth, L.L. and Asemota, H.N. "Citrus peel polymethoxylated flavones extract

modulates liver and heart function parameters in diet induced hypercholesterolemic rats”. *Food and Chemical Toxicology* 51 (2013) 306–309.

- Dewayne Stennett, Frederick Oladeinde, Andrew Wheatley, Joseph Bryant, Lowell Dilworth and Helen Asemota. (2013). Effects of *Dioscorea polygonoides* (Jamaican Bitter Yam) supplementation in normocholesterolemic and genetically modified hypercholesterolemic mice species. *Journal of Food Biochemistry* (Available online at <http://authorservices.wiley.com/bauthor/onlineLibraryTPS.asp?DOI=10.1111/jfbc.12022&ArticleID=1104068>).
- Stewart, C., Kon, T., Rojas, M., Graham, A., Darren, D., Gilbertson, R., Roye, M. (2014). The molecular characterization of a Sida infecting begomovirus from Jamaica. *Archives of Virology* 15 (2014):375-378. (Online version published 2013 *Archives of Virology*. Volume 158(8) <http://www.ncbi.nlm.nih.gov/pubmed/23933798>).
- Roberts M, Minott DA, Pinnock S, Tennant PF, Jackson JC. “Physicochemical and biochemical characterization of transgenic papaya modified for protection against Papaya ringspot virus”. *Journal of the Science of Food and Agriculture*. 94 (2014): 1034–1038.

Books

- Coates-Beckford, PL and Tennant PF. *Plant Disease: The Jamaican Experience*. University of the West Indies Press, Kingston, Jamaica, 2013. 628 pp.

Non-Refereed Journal

- Mitchell, S.A. “Jamaican ethnomedicine and pharmacognosy: Do you have the right plant and in enough quantity for research? And to support new industries?” *The Chemist*. 1, 2 (2014): 19–23.

GRANTS/INCOME GENERATION

- Grand Challenges Canada Grant No. 0389-01 for performance of

research entitled “A Simple Yeast-Based Blood Screening Assay” was approved by the University of Toronto reference number: 495700-Subgrant 1, 2013–2015, (CAD\$33,900). Dr. Marcia Roye will represent the Centre in the execution of this international project.

- The Caribbean Herbal Business Association (CBHA) awarded the sum of Five thousand US Dollars (US\$5000.00) to the Biotechnology Centre on July 14, 2014. The sum is a one-time grant towards CHBA Project #001/14 which was developed to create a portal through which Caribbean Herbal Businesses can exhibit their products, post business-relevant information, and allow the herbal businesses in the Caribbean to interact with the scientific, regulatory and business world. The project is also mandated to create a platform for advancing the research and development of ethnobotanical and herbal products along the value chain. The project duration is six months, and work is expected to start in September 2014 specifically on the incorporation of CHBA as a non-for-profit legal company, revamping the CHBA website, and the production of a historical CHBA e-book 2002–2010. The CHBA-Jamaica Chapter, a local company, as well as the Mona Institute for Research and Innovation will be helping us with the execution of this project.

AWARDS

- The Yam Biotechnology research group, led by Professor Helen Asemota, received the FMS ‘Most Outstanding Research Award’ for the 2014 Research Day awards, for 7 high impact Journal Publications during the 2012–13 academic year. It was noted that their research resulted in the first USA patent approved for UWI.
- The Biotechnology PhD Thesis titled “Chemical modification of yam (*Dioscorea* sp.) starches and their potential use in pharmaceutical formulations” by Dr. Alexia Harvey was selected by the Campus Committee for Graduate Studies and Research as the “most outstanding thesis” for the 2012/13 academic year. Alexia Harvey, a postgraduate student of Professor Helen Asemota et al., received the award on Thursday, March 13, 2014 at the Mona Visitors’ Lodge.

- Biotechnology PhD student, Ms. Racquel Wright, supervised by Asemota et al., received an NIH (National Institute of Health) Research Fellowship to facilitate her studies on Moringa antioxidants and their possible use in reducing oxidative stress in Sick Cell anaemia.

PUBLIC SERVICE

Professor Helen Asemota

- Ordained Reverend – Holiness Christian Church of Jamaica, and a Pastor at the Rose Town Kingston Branch.
- Chairman and Co-Founder of the Imade Asemota Foundation for Sick Cell Research and Patients' Welfare (IAF), North Carolina, USA.
- Curriculum Reviewer, Ministry of Education. Jamaica.

Dr. Sylvia Mitchell

- Member, Caribbean Access and Benefit Sharing (ABS) Development Initiative Steering Committee
- Member, Society for In vitro Biology – Education Chair, and Co-Editor of In vitro Report
- Member, Management Board, College of Agriculture and Science Education (CASE)
- Member, Standards Council, Standards and Technical Sub-Committee, National Quality Awards, and Chair of the Board of Examiners, Bureau of Standards of Jamaica (BJS)
- Member, Hope Garden's Education and Research Sub-Committee, NPF