

DEPARTMENT OF CHEMISTRY

**Professor Paul B. Reese, BSc (Hons), UWI, DPhil, *Sussex*, CChem,
FRSC – Head of Department**

OVERVIEW

The 2009-2010 academic year was a productive one for the Department of Chemistry. Despite the budgetary constraints, the department has managed to maintain its standards of excellence in teaching and research. It continues to provide an environment which fosters and promotes the development of highly trained professionals.



Forty-seven undergraduate students, including five who gained first class honours, completed a Bachelor of Science in Chemistry and two postgraduate students completed their Doctor of Philosophy degree while another two completed their Master of Philosophy. Enrolment at the Introductory and Advanced levels continues to increase steadily.

The Peer-Led Team Learning (PLTL) initiative continues to improve the learning experience and performance of introductory level students. Other programmes such as the Occupational and Environmental, Safety and Health (OESH) programme and the CAPE workshops continue to have a positive impact on the participants.

Several of our academic staff have been featured and awarded for their excellent performance in teaching and research. The Department snatched half of the awards in the Faculty of Pure and Applied Sciences from the Principal's Research Day Awards Ceremony. Additionally, the 21 refereed publications and 15 presentations at major conferences is an indication of the quality of research being produced by the Department.

Over **J\$3 Million** of research grants was secured for several projects in the department, while another **J\$12.5 Million** in income was generated.

HIGHLIGHTS OF MAJOR ACTIVITIES

The Mona Symposium

The twenty third “Mona Symposium: Natural Products and Medicinal Chemistry” was held on January 4-7, 2010. The Organizing Committee was comprised of Mr. Oscene Barrett (Student Representative), Drs. Nadale Downer-Riley, Winklet Gallimore, Julie-Ann Grant, Sandra Jarrett, Donna Minott-Kates, Roy Porter and Profs. Yvette Jackson, Helen Jacobs and Paul Reese (Organizing Secretary).

More than 60 persons, including 35 visiting participants, attended the conference. There were 28 international attendees (from Canada, Japan, Germany, the UK and the USA) and seven regional attendees (from Cave Hill and St. Augustine campuses and UTECH). The scientific programme consisted of nine plenary lectures, eleven short papers and a poster session. Tribute was paid to Professor William Reynolds who has made an enormous contribution to the discipline, spanning 50 years. Prof. Reynolds has assisted many students from the University of the West Indies (Cave Hill, Mona and St. Augustine) with their research work and has been a consistent participant in the Mona Symposium during the last 14 years.

The Occupational and Environmental, Safety and Health (OESH) Programme

For the academic year 2009-2010, a record-breaking 41 students registered for the MSc programme of which 14 were part time. Seven students registered for the BSc programme.

Peer-Led Team Learning (PLTL) Project

The Peer-Led Team Learning (PLTL) programme had been implemented by Dr. Novelette Sadler-McKnight and Mr. Imron Miller in the 2008-2009 academic year. Due to the success of the pilot project, the programme was executed on a larger scale. Approximately 20% of the introductory level

students participated and, on average, their final marks were 10% higher than those not participating.

Outreach Activities

CAPE Workshop

The annual workshop on spectroscopy and chromatography for students sitting the Caribbean Advanced Proficiency Examinations (CAPE) in Chemistry was held between January 18 and 22. There was a 56% increase in the number of participants compared to last year. A total of 762 students and 36 teachers from 35 secondary institutions across the island participated.

BEd (Distance) Project and BEd/Open Campus Programme

The Department accommodated six students from the Open Campus programmes for laboratory sessions during the summer.

The Chemical Society

The membership of The Chemical Society Mona (ChemSoc) for the academic year 2009-2010 was 36, although approximately 130 persons attended the meetings regularly. The topic “Alternative/Renewable Energy” was the focal theme of several presentations and discussions. The Society undertook a number of fun, educational and motivational activities. It offered academic advice and conducted free tutorials for the members and visitors in preparation for end of semester examinations.

Student Enrolment

The number of students enrolled for courses at the preliminary level decreased by 33% from the last academic year, while enrolment in courses at the introductory level increased by 7%. Six new graduate students joined the Department.

Level	2006/2007	2007/2008	2008/2009	2009/2010
Preliminary	203	189	193	129
Introductory	223	377	492	526
Postgraduates	60 (32 F/T; 28P/T)	64 (32 F/T; 32 P/T)	59 (31 F/T; 28 P/T)	45 (24 F/T; 21 P/T)

Book Loan Scheme

Due to the significant increase in enrolment over the past two years, access to required textbooks through the library facility has become very competitive. In an effort to increase access and improve performance the Department launched a book loan scheme. Books were purchased for Chemistry students at all levels, at a total cost of J\$1.5 Million, and were rented by semester. The programme was well subscribed. Demand for textbooks for the introductory courses was highest, followed by those for the preliminary courses.

ACHIEVERS AND AWARDEES

Principal's Research Day Awards

Two members of staff received the Principal's Research Day Award for Best Research Publication. They are **Professor Willem Mulder** for his paper entitled "Potential of zero charge as a sensitive probe for the titration of ionisable self-assembled monolayers," *Electrochem. Commun.* 2008, 10, 1548-1550 and **Dr. Camille Bowen-Forbes** for her paper – "Ursolic acid analogues: non-phenolic functional food components in Jamaican raspberry fruits," *Food Chemistry*, 2009, 116, 633-637. **Drs. Michael Coley** and **Anthony Greenaway** received the Principal's Research Day Award for the Research Project with Most Potential for Economic Impact. The title of their project is "Caustic-soluble cadmium and zinc in JAMALCO bauxite."

Silver Musgrave Medal

Professor Helen Jacobs was the recipient of the Silver Musgrave Medal for Organic Chemistry (October 2009) from the Institute of Jamaica.

TWAS Fellowship

Dr. Marvadeen Singh-Wilmot was selected as one of five Young Affiliate Fellows of the Third World Academy of Sciences for 2010.

Faculty Teaching Awardees

Drs. Michael Coley, Donna Minott-Kates, Willard Pinnock and **Marvadeen Singh-Wilmot** were recipients of the award for Outstanding Achievement in Teaching at the Faculty Awards Ceremony. Dr. Marvadeen Singh-Wilmot also received the award for the Most Outstanding Achievement in Teaching.

Departmental Awards and Prizes

Seven undergraduate students received awards, ranging from \$10,000 to \$60,000, for their academic performance in Chemistry. They are **Orain Brown** (Cedric Hassall), **Tomeika Myers** (Garfield Sadler), **Je-Ann Murray** (Wilfred Chan), **Ruel Campbell** (L. J. Haynes), **Isaac Morrison** (Chemistry Department), **Michal Camejo** (Pavelich/Honkan) and **Kervern James** (Bert Fraser-Reid).

Promotion & Tenure

Dr. Roy Porter was promoted to the level of Senior Lecturer at the January sitting of the Campus Appointments Committee. **Dr. Camille Bowen-Forbes'** contract was extended for an additional three years, while **Drs. Marvadeen Singh-Wilmot** and **Paul Maragh** were granted indefinite tenure.

Research Fellowships

Drs. Camille Bowen-Forbes and **Roy Porter** were recipients of UWI Research Fellowships for the period August 2009 – July 2010. The investigations were conducted by **Dr. Kayanne McCook-Russell** – “*Study on the Phytochemical and Nutraceutical Potential of Rubus ellipticus Fruits (Cheeseberry)*” (with Dr. Bowen-Forbes) and **Dr. Petrea Facey** – “*Investigations of Endophytic Marine Fungi associated with Jamaican Mangroves for Novel and Bioactive Compounds*” (with Dr. Porter).

POSTGRADUATES

Two postgraduate students successfully defended their theses and were awarded the PhD degree. They are **Andrew Morris** supervised by Prof. Y. Jackson and **Kenesha Wilson** supervised by Dr. Willard Pinnock. Another two students, **Paul Clare** and **Tavia Riggon**, (supervised by Prof. P. Reese and Dr. W. Gallimore respectively) successfully completed their MPhil degrees. Three students transferred from the MPhil to the PhD programme.

Student Exchange Programme

Two MPhil students, **Rochette Sinclair** and **Jevon Samuels**, visited the University of Gothenburg, Sweden from January 19 to June 10, 2010. While there they continued their research projects and read two graduate courses each. During that period the Department hosted four visiting undergraduate students from that University.

PAPERS PRESENTED

- **C. S. Bowen-Forbes**, V. Mulabagal, Y. Liu, K. McCook-Russell and M. G. Nair, “Jamaican Blackberry and Raspberries with Health-Beneficial Properties” (Poster). Denbigh Agricultural Show, Clarendon, Jamaica (July -August 2010).
- P. Nelson and **H. Ellis**, “Room Temperature Molecular and Lattice Structures of a Homologous Series of Anhydrous Zinc(II) n-Alkanoates”. TWAS-ROLAC Caribbean Young Scientist and Technologist Conference, Ocho Rios, Jamaica (January 2010).
- O. Barrett, **N. Downer-Riley** and **Y. Jackson**, “Novel Approaches to the Synthesis of Benzothiazoles and their Analogues”. 239th American Chemical Society National Conference, San Francisco, California, USA (March 2010).
- P. C. Facey and **R. B. R. Porter**, “Investigations of Endophytic Marine Fungi Associated with Jamaican Mangroves for Novel and Bioactive Compounds”. BiCentenario- Colloquium of the

Alexander von Humboldt Foundation, Mexico City, Mexico (June 2010).

- **M. A. Singh-Wilmot**, R. Sinclair, “Tetranuclear and Nonanuclear Lanthanide(III) Nanoclusters: Synthesis and Structures,” (Poster). TWAS-ROLAC Caribbean Young Scientist and Technologist Conference, Ocho Rios, Jamaica. (January 2010).
- **M. A. Singh-Wilmot** “Novel Materials from Lanthanide(III) Nanoclusters”. 7th Regional Conference of Young Scientist of TWAS-ROLAC, Rio de Janeiro, Brazil (May 2010).

Papers presented at 23rd Mona Symposium on Natural Products and Medicinal Chemistry, Kingston, Jamaica (January 2010).

- **C. S. Bowen-Forbes**, V. Mulabagal, Y. Liu and M. G. Nair, “Anthocyanin content and biological activity of extracts and phytochemicals from Jamaican *Rubus* fruits” (Poster)
- O. Barrett, **N. Downer-Riley** and **Y. Jackson**, “Approaches to the Synthesis of Benzobisthiazoles and their Derivatives”
- A. L. C. Morris and **Y. A. Jackson**, “Synthesis of a 6H-Chromeno[3,4-b]quinoline and a 6a,12a-Dehydro-7-azarotenoid”
- S-A. Parker and **H. Jacobs**, Semi-synthetic Polyprenylated acylphloroglucinols (PPAPs) from 7-epi-nemorosone, the major constituent of *Clusia flava*. (Poster).
- A. A. Johnson and **H. Jacobs**, A 2-acylcyclohexane-1,3-dione from *Peperomia* sp. nov. of Jamaica. (Poster).
- F.W.O. Banton and **R. B. R. Porter**, “Secondary metabolites from the aerial parts of *Bursera lunanii*,” (Poster).
- P. C. Facey and **R. B. R. Porter**, “Bioactive Compounds from Endophytic Marine Fungi Associated with the Jamaican White Mangrove, *Laguncularia racemosa* L.” (Poster).

- D. A. C. Biggs, **R. B. R. Porter**, W. F. Reynolds, P. C. Facey and L. A. D. Williams, “Insecticidal, antioxidant and antimicrobial activities of abietane diterpenoids from *Hyptis verticillata*”.
- P. C. Peart, A. R. M. Chen, **P. B. Reese** and W. F. Reynolds, “The biotransformation of 3 β ,17 β -dihydroxyandrost-5-ene using free and immobilized fungi”.

PUBLICATIONS

Refereed Journal Articles

- * **M. Bakir** and O. Brown, “Synthesis, characterization and molecular sensing capability of fac-[Re(CO)₃(k²-N,N-dpktsc)Cl] where dpktsc = di-2-pyridylketone thiosemicarbazone” *J. Mol. Struct.* 2009, 930, 65–71.
- * **M. Bakir**, O. Green and **M. Singh-Wilmot**, “Synthesis, Spectroscopic, and X-ray Crystallographic Analysis of Manganese Compounds of Di-2-pyridyl ketone thiophene-2-carboxylic acid hydrazone (dpktch): The Reaction of Mn(CO)₅Br with dpktch,” *J. Mol. Struct.*, 2010, 967, 174-182.
- * Y. Liu, V. Mulabagal, **C. S. Bowen-Forbes** and M. G. Nair, “Inhibition of lipid peroxidation, cyclooxygenase enzyme, and human tumor cell proliferation by compounds in herbal water,” *Mol. Nutr. Food Res.* 2009, 53, 1177-1186.
- * E. Petrunak, A. C. Kester, Y. Liu, **C. S. Bowen-Forbes**, M. G. Nair and G. E. Henry, “New benzophenone O-glucoside from *Hypericum ellipticum*.” *Nat. Prod. Comm.* 2009, 4, 507-510.
- * G. E. Henry, M. S. Campbell, A. Zelinsky, Y. Liu, **C. S. Bowen-Forbes**, L. Liya, M. G. Nair, D. C. Rowley and N. P. Seeram, “Bioactive acylphloroglucinols from *Hypericum densiflorum*,” *Phytother. Res.*, 2009, 23, 1759-1762.
- * **C. S. Bowen-Forbes** and **D. A. Minott**, “Structural characterization of hypoglycin B, a diastereomeric dipeptide

- from the ackee fruit (*Blighia sapida* Koenig) by NMR experiments,” *Magn. Reson. Chem.*, 2009, 47, 1004-1006.
- * **N. K. Downer-Riley** and **Y. A. Jackson**, Highlight Syntheses. *Annu. Rep. Prog. Chem., Sect. B: Org. Chem.*, 2010, **DOI:** 10.1039/b927090f.
 - * R. C. Higgins, N. O. Townsend and **Y. A. Jackson**, “Benzylic Oxidation of N-Acyl-1,2,3,4-Tetrahydroquinolines,” *Heterocycles*, 2009, 78, 3011-3021.
 - * J. A. Grant, T. Bonnick, M. Gossell-Williams, T. Clayton, J. M. Cook and **Y. A. Jackson**, “Synthesis, Pharmacological Studies and Molecular Modeling of some Tetracyclic 1,3-Diazepinium Chlorides”, *Bioorg. Med. Chem.*, 2010, 18, 909-921.
 - * A. L. C. Morris and **Y. A. Jackson**, “Synthesis of a 6H-Chromeno[3,4-b]quinoline and a 6a,12a-Dehydro-7-azarotenoid,” *Heterocycles*, 2010, 81, 371-380.
 - * O. V. Barrett, **N. K. Downer-Riley** and **Y. A. Jackson**, “Synthesis of Some Novel Benzobisthiazoles,” *Heterocycles*, 2010, 8, 1641-1649.
 - * D. S. Simpson, S. McLean, W. F. Reynolds and **H. Jacobs**, “Tetranortriterpenoids from *Spathelia sorbifolia* (Rutaceae),” *Natural Product Communications* 2010, 5, 859-862.
 - * **P. T. Maragh**, “Reaction Mechanisms in Solution,” *Annu. Rep. Prog. Chem., Sect. A: Inorganic Chemistry*, 2010, 106, 410-428.
 - * M. A. W. Lawrence, **P. T. Maragh** and **T. P. Dasgupta**, “Kinetics and mechanism of the aquation of a series of mixed-metal oxo-centered trinuclear cations, μ_3 -oxo-triaqua-hexakis(carboxylato)bis-(chromium(III)(iron(III)))⁺, [Cr^{III}₂Fe^{III}O(RCOO)₆(H₂O)₃]⁺, (R = H, CH₃, CH₃CH₂ and (CH₃)₂CH) in perchloric acid media,” *J. Coord. Chem.*, 2010, 63, 2517-2527.

- * **W.H. Mulder**, “On the Theory of Electrostatic Interactions in Suspensions of Charged Colloids,” *Soil Science Society of America Journal*, 2010, 74, 1-4.
- * G-A. Junor, **R. B. R. Porter**, T. H. Yee and T. Waugh, “The volatile constituents from the leaves, bark and fruits of *Bursera aromatica* (Proctor) found in Jamaica,” *Journal of Essential Oil Research*, 2010, 22, 19-22.
- * Y. A. Bailey-Shaw, K. D. Golden, A. G. M. Pearson and **R. B. R. Porter**, “Characterization of Jamaican Agro-Industrial Wastes. Part I: Characterization of Amino Acids Using High Performance Liquid Chromatography: Precolumn Derivatization with Phenylisothiocyanate,” *J. Chromatogr. Sci.*, 2009, 47, 674-680.
- * D. A. C. Biggs, **R. B. R. Porter** and W. F. Reynolds, “Sesquiterpene and acyclic diterpenes from *Hyptis verticillata* Jacq.,” *Natural Product Communications*, 2009, 4, 307-310.
- * P. R. D Wright, **R. Rattray**, G. Lalor and R. Hanson, “Minimal health impact from exposure to diet-sourced cadmium on a population in central Jamaica,” *Environ. Geochem. Health*, 2010, DOI 10.1007/s10653-010-9318-6
- * **M. Singh-Wilmot, I. Kahwa**, A. J. White, D. J. Williams and A. Lough, “Tunable Electronic Interactions in Small Lanthanide(III) Clusters: The Comparative Effects of OH⁻ and O²⁻ Supramolecular Glues on Europium(III)-to- Dysprosium (III) Energy Transfer,” *Polyhedron*, 2010, 29, 270-279.
- * K. R. Christian and **J. C. Jackson**, “Changes in total phenolic and monomeric anthocyanin composition and antioxidant activity of three varieties of sorrel (*Hibiscus sabdariffa*) during maturity,” *J. Food Comp. and Anal.*, 2009, 22, 663-667.

Non-Refereed Publications

- * **C. Bowen-Forbes**, UWI Notebook: Jamaican raspberry fruit with health-beneficial properties, *The Gleaner*, 2009, February 7, 2010, Arts: 5.
- * **M. D. Coley**, J. James and **A. M. Greenaway**, “Mineralogy of Chromium and Zinc in Jamalco Bauxites” 2nd Project Report, Alcoa of Australia Ltd., September, 2009
- * **M. D. Coley**, J. James and **A. M. Greenaway**, “Mineralogy of Chromium and Zinc in Jamalco Bauxites” 3rd Project Report, Alcoa of Australia Ltd., March, 2010.

Book

- * **Kenneth E. Magnus** and **Robert J. Lancashire**, “The Department of Chemistry, UWI, Mona, with emphasis on the early years”, Ian Randle Publications, 2010. ISBN 978-976-637-410-5.

INCOME GENERATION & RESEARCH GRANTS

Dr. H. Ellis

- **J\$80,000.00** from the Ministry of Agriculture for Consultancy.

Dr. A. Greenaway

- **US\$1,200.00** from the United Nations University International Network on Water, Environment and Health for collection of fish for testing for Persistent Organic Pollutants.
- **J\$300,000.00** from commercial analyses.
- From the Mona Campus Committee for Research & Publications and Graduate Awards: **US\$1,700.00** for standard reagents to support project;
- **US\$3,200.00** for centrifuge

Prof. H. Jacobs

- **J\$1,447,470.00** from the Research Fellowship Committee (Special New Initiative Grant), Mona to fund project entitled *“Technology-enhanced isolation of natural products for enzyme-based and whole-organism bioactivity screening.”*

Dr. R. Porter

- **\$191,000.00** from the Research and Publications and Graduate Awards for the project *“Phytochemical Investigation of Jamaican Bursera species.”*
- **£6,500** from the Alexander von Humboldt Foundation.

Prof. P. Reese

- **US\$2,100.00** from the Mona Campus Committee for Research & Publications and Graduate Awards (February 2010) to cover costs associated with project entitled *“Biotransformation of terpenes using endophytic fungi.”*

Dr. N. Sadler-McKnight

- Generated a total of **J\$2,484,600.00** from outreach activities.

Dr. M. Singh-Wilmot

- **US\$3,000.00** from the Mona Campus Committee for Research & Publications and Graduate Awards for project entitled *“Novel Framework Materials from Lanthanide(III) Nanoclusters and their Use as Gas Adsorbent and Fluorescence Sensors.”*

Other Income Generated

- Summer School – **\$7,677,355.50**
- Rental of Facilities – **\$267,500.00**
- Consultation Fees – **\$1,846,688.02**

PUBLIC SERVICE

Prof. M. Bakir

- Referee to the Journals: *Coordination Chemistry, Inorganic Chemical Communications, Talanta* and *Polyhedron*.

Prof. T. Dasgupta

- President, Caribbean Academy of Sciences
- Executive Committee Member, Regional Office of International Council of Science
- Member, Organizing Committee of UNITAR Project (Office of Prime Minister)
- Chairman, National Adhering Organization for IUPAC
- Member, POPs National Implementation Programme in Jamaica
- Member, Third World Academy of Sciences
- Editor, *Jamaica Journal of Science and Technology*

Dr. H. Ellis

- Member, Bureau of Standards Jamaica Paints and Surfaces Committee.

Dr. W. Gallimore

- Member, 23rd Mona Symposium Organising Committee
- First Year Experience (FYE) Facilitator

Dr. A. Greenaway

- Member, National Ozone Commission.
- Member, Bureau of Standards Jamaica Water System Components Technical Committee.
- Member, Jamaica National Agency for Accreditation Technical Advisory Committee.

Prof. Y. Jackson

- Scientific Consultant, Tanaud International.

- Regional Editor, MOLECULES.
- Reviewer for paper submitted to various chemistry journals.
- Member, Board of Governors, Hampton School for Girls.

Prof. H. Jacobs

- Member, Chemicals Review Committee, Ministry of Health and Environment
- UWI Representative, University Council of Jamaica's Academic Board of Studies (for science).
- Chief Editor, *Jamaica Journal of Science and Technology*
- Referee for papers submitted to *Natural Product Communications*
- Member, Organic Chemistry Division of the International Union of Pure and Applied Chemistry (IUPAC)

Prof. R. Lancashire

- Secretary, Caribbean Academy of Sciences.
- Appointed Secretary of IUPAC Committee on Printed and Electronic Publications (CPEP).
- IUPAC representative to ICSU Committee on Data for Science and Technology (CODATA).
- Member, Advisory Group on ChemSpider.com.

Dr. P. Maragh

- Assistant Chief Examiner, CXC CSEC Chemistry
- External Examiner for Chemistry, University of Technology
- External Examiner for Chemistry, Joint Board for Teacher Education
- External Examiner for Chemistry, MICO University
- External Examiner for Chemistry, College of Agriculture, Science & Education

Dr. D. Minott-Kates

- Vice Chairman, CARICOM Regional Organization for Standards and Quality (CROSS-Q)

- Member, Scientific Research Council Board Sub-Committee for Food Technology
- Member, WIGUT Management Committee
- Board Member, Grove Primary School, Gordon Town
- Executive Member, Mona Preparatory School Parents Teachers Association

Dr. W. Pinnock

- Faculty of Pure and Applied Sciences Rep., University Hospital of the West Indies Research Ethics Committee
- Board Member, National Water Resources Authority
- Chairman, Technical Advisory Sub-Committee, National Water Resource Authority

Dr. R. Porter

- Member, Technical Committee for Propane-Butane Liquefied Petroleum Gas standards, Bureau of Standards Jamaica.
- Member, Technical Committee (TC 93) for all standards relating to starch and its by-products, Bureau of Standards, Jamaica.
- First Year Experience (FYE) Facilitator

Dr. R. Rattray

- Secretary, Laboratories Association of Jamaica
- Director, Lions Club of Mona

Prof. P. Reese

- Member, Equine Drug Testing Committee, Jamaica Racing Commission.
- Member, Product Research & Development Committee, Scientific Research Council.
- Board Member, Jamaica National Agency for Accreditation, Ministry of Industry, Technology, Energy & Commerce.

- Chair, Technical Advisory Committee, Jamaica National Agency for Accreditation, Ministry of Industry, Technology, Energy & Commerce.

Dr. N. Sadler-McKnight

- Executive Secretary, Chemistry Alumni and Friends (CHEMSAF)
- Member, Technical and Finance Committee of the Scientific Research Council (SRC)
- Faculty Advisor, UWI Circle K Club
- External Examiner, Chemistry, College of Agriculture, Science and Education (CASE)

Dr. M. Singh-Wilmot

- First Year Experience (FYE) Facilitator
- Member, Cooperative Development Committee, Jamaica
- Young Affiliate Fellow of the Third World Academy of Sciences (2010)