

## DEPARTMENT OF CHEMISTRY



Professor Helen Jacobs, BSc, PhD, *UWI*  
Head of Department

### OVERVIEW

In academic year 2012–2013 there were 58 students graduating with BSc degrees in Chemistry – two with first class honours and 14 with upper second class honours; five candidates were awarded higher degrees. Faculty members published a total of 16 journal articles and gave six conference presentations. The revised curricula for programmes leading to the majors and minors in General Chemistry and Food Chemistry were implemented. This entailed mounting 18 new Level II and Level III courses and necessitated careful academic counseling and close management of the programmes of those students caught in the transition. Credit for the smooth crossover to the new system is due to Chair of our Curriculum Committee, Dr. Novelette Sadler-McKnight, Undergraduate Studies Coordinator, Dr. Michael Coley and to Drs. Paul Maragh and Donna Minott Kates. Another milestone in the life of the department this past year was the commencement of delivery of the self-financing

master's programme in Food and Agro-Processing Technology (MSc FAPT) with a first cohort of eleven students. This programme is coordinated by Dr. Ian Thompson, who is to be congratulated for an excellent job of managing the startup and first year of operation.

## **HIGHLIGHTS OF MAJOR ACTIVITIES**

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

There were twenty-seven (27) students in the MSc OESH in September 2012; twenty-one (21) new and seven (7) returning. Eleven (11) students graduated from the programme in November 2012. At the BSc level eight (8) students were registered in Advanced OESH courses. Five students were doing the OESH Options while two (2) students were doing majors in other areas while doing OESH courses.

### **Welcome Receptions For Advanced Chemistry Students**

On Thursday 27th September 2012 the department mounted an interactive one-hour program of informational and motivational presentations for new Level II chemistry students. Guest presenters were Mr. Roger Bent, new Coordinator of the Academic Support Unit whose talk was entitled "Managing Life – A Student's Guide to Success" and Dr. Willard Pinnock, retired Senior Lecturer in Physical Chemistry who spoke on "Opportunities in Chemistry". A motivational seminar dubbed 'Catalyst 2013' was held on 31st January 2013 for Level II and Level III students. Guest presenter, Professor Tony Ellis did an engaging presentation "The Proven Formula". The aim was to get these students to engage with and excel in their academic programs, and to graduate in minimum time. Both events were deemed highly successful and elicited very positive feedback from the students. Key organizers were the ChemSoc executive, who co-hosted the events, Mrs. Tracia Johnson-Blair, Mrs. Mitzie Samuels and Drs. Michael Coley, Roy Porter, Robin Rattray and Marvadeen Singh-Wilmot.

### **NEPA Visible Emissions Training**

The Department of Chemistry hosted two Visible Emissions training courses (Smoke Schools) which were run by NEPA, 22nd January and 23rd July 2013; 35–40 persons attended the classroom portions of the training. This training is administered by Eastern Technical Associates (ETA) from the US; ETA is a United States Environmental Protection Agency (US-EPA) certified training institution. Two to four members of the Department of Chemistry participated in each course. The skill set developed in these courses is recognized internationally.

### **STAFF MOVEMENTS**

Dr. Donna Minott Kates was on sabbatical leave for academic year 2012–2013; she was replaced by Dr. Andrea Goldson-Barnaby. Mr. Dennis Bailey, Technician, successfully defended his PhD. thesis in Biotechnology, entitled “Anthocyanins in Moonshine and Darknight Yams (*Dioscorea alata*) and their Bioactivities in Cancer Cell Lines and Animal Model”. Ms. Simone Williams and Ms. Maxine Hoffman were appointed Administrative Assistant and Scientific Officer, respectively to the MSc FAPT programme. Ms. Camelia Campbell assumed duties as Senior Secretary in the Department in February 2013.

### **CAPE WORKSHOP**

During the period January 14–18, 2013, the Department held another successful series of workshops on Spectroscopy and Chromatography for the Caribbean Advanced Proficiency Examinations (CAPE) in Chemistry. A total of 973 students and 50 teachers participated. This opportunity was also used to meet with teachers to discuss issues pertaining to Chemistry instruction in their schools. As in previous years, this workshop was coordinated by Dr. Novelette Sadler-McKnight.

**STUDENT ENROLMENT**

Intake at the introductory level declined by about 10% relative to the previous year.

**Table 1:** Numbers of students reading courses in chemistry, 2009–2013

Level	2009–2010 Sem 1/Sem 2	2010–2011 Sem 1/Sem 2	2011–2012 Sem 1/Sem 2	2012–2013 Sem 1/Sem 2
Preliminary	129/128	134/116	240/219	239/218
Introductory	532/465	537/458	597/525	546/506
Advanced	271/249	288/268	266/258	256/227
Postgraduates	45 (24 F/T; 21 P/T)	50 32 F/T; 18 P/T	45 30 F/T; 15 P/T	42 29F/T; 13 P/T

**BOOK LOAN SCHEME**

The Department continues to operate its book loan scheme for undergraduate students. Demand for textbooks for the introductory courses is still highest, followed by those for the preliminary courses.

**AWARDS AND PRIZES**

Miss Julia Brown and Dr. Marvadeen Singh-Wilmot were recognized for outstanding teaching assessments at the Faculty Awards Ceremony. The papers “Impact of Seed Size on Residual Hypoglycin Levels in Ackee “. D. Minott–Kates and S. Dundee. Food Research International, 2012, 47(2), 306–309 and “Proton Transfer Voltammetry Modified with Acid Thiol Monolayers”. W. Mulder and collaborators. Analytical Chemistry 2012, 84, 5778–5786 were selected as two of the three best

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publications from the FST in 2011–2012. The authors received the Principal's Research Awards in this category for Research Day 2013.

Eight undergraduate students received awards, ranging from \$15,000 to \$60,000, for their academic performance in Chemistry. They are Kristen Morgan (Cedric Hassall), Vanessa Dockery (Garfield Sadler), Garren Nelson (Wilfred Chan), Alecia Robinson (Leonard J. Haynes), Kemar Thompson (Chemistry Department), Carlos Mingoies (Pavelich/Honkan) and Avalon Gilpin (Bertram Fraser-Reid), and the Willard Pinnock Prize was awarded to Kemar Francis.

Keisean Stevenson, who graduated with a BSc (Special) degree in Chemistry and gained first class honours, was the valedictorian for the Faculty of Science and Technology at the graduation ceremony on the November 2, 2012.

A UWI research group comprised of Mrs. Denise Daley-Beckford and Dr. Ruby Lisa Alexander-Lindo of the Biochemistry Section of the Department of Basic Medical Sciences, Dr. Trevor Yee of the Natural Products Institute and Professor Paul Reese of the Department of Chemistry won two awards in the Scientific Research Council's Innovations in Science and Technology Competition for 2012. Their winning research project was entitled "Novel Treatment for Hyperglycaemia and Hypertension". The project was awarded the Sectional Prize in the Health and Wellness Category as well as the prestigious Overall Prize for the Innovation of the Year for Science and Technology for 2012. The group's research was judged most likely to have a significant effect in the field of Science and Technology and won from a field of 177 entrants.

Professor Robert Lancashire received one of the eight (8) Royal Society Science Awards in recognition of his contribution to the work of Antony John Williams, Head of Chemoinformatics for the Royal Society of Chemistry.

**POSTGRADUATES**

Four students completed and were awarded PhD degrees and two students received MPhil degrees. Names of the students who completed higher degrees in Chemistry in 2012–2013, and those of their supervisors are listed in the following table.

**Table 2:** Higher degrees in chemistry awarded in 2013

Degree completed	Name	Supervisor
PhD	Oscene Barrett	Professor Y. Jackson
	Denton Fearon	Dr. N. Downer-Riley
	Kerry-Ann Green	Professor P. Reese
		Professor T. Dasgupta, Dr. P. Maragh
MPhil	Peter Nelson	Professor H. Ellis
	Antoinette Gayle	Dr. D. Minott Kates
	Monique Thompson	Dr. W. Gallimore

**VISITORS TO THE DEPARTMENT**

**Professor Anthony K. Cheetham**, Goldsmiths' Professor of Materials Science, Department of Materials Science and Metallurgy, University of Cambridge, UK and Fellow of the Third World Academy of Sciences; November 8–9, 2012 on the first stop of a tour of the departments of Chemistry of the Mona, Cave Hill and St. Augustine campuses of UWI. His visit was organized by Cariscience and jointly funded by the three departments.

**Dr. Shobha Sriharan**, Professor of Environmental Science, Agriculture Department, Virginia State University; November 19, 2012.

**Professors Åke Nilsson** and **Lennart Sjölin** from the University of Gothenburg, Sweden; visited April 4–13, 2013 under the aegis of the Linnaeus–Palme faculty and student exchange programme. The main purpose of this visit was to conduct an evaluation of the programme by meeting with faculty and students who have participated in the programme and to explore ways in which connections between UWI, Mona Campus and the University of Gothenburg can be strengthened through collaboration in teaching and research.

## SEMINARS

Under the leadership of the Seminar Coordinator, Dr. Marvadeen Singh-Wilmot, members of the department enjoyed an active seminar programme. Nineteen seminars spanning a wide range of topics were delivered by visitors, faculty and postgraduates; seminars delivered by visitors to the department are listed below.

- **Professor Anthony K. Cheetham**, Goldsmiths' Professor of Materials Science, Department of Materials Science and Metallurgy, University of Cambridge, UK and Fellow of the Third World Academy of Sciences. "Structure-Property Relationships in Inorganic-Organic Framework Materials (research seminar) New Materials for the 21st Century"(public lecture) November 9, 2012.
- **Professor Shobha Sriharan**, Professor of Environmental Science, Agriculture Department, Virginia State University, Petersburg. "A Case Study Approach for Interactive Teaching: Learning of Global Topics in Agricultural, Environmental and Food Science". November 19, 2012.
- **Professor Robert Bates**, Professor Emeritus of Food Science, University of Florida and Visiting Lecturer, MSc. FAPT, UWI, Mona. "The Chemistry and Alchemy of Brewing" January 31, 2013.
- **Mr. Aubyn Hill**, Chief Executive Officer Corporate Strategies Limited and Chairman of Nation Growth Micro Finance Ltd. "Use Knowledge Economy to Generate Growth". February 21, 2013.
- **Dr. Adrian Spence**, Research Scientist and Head of Spectroscopy Lab, International Center for Environmental and Nuclear Sciences (ICENS). "Chemical and Degradation Characteristics of Soil Microbial Biomass". April 4, 2013.

## PAPERS PRESENTED

- **M. Bakir**; O. Brown; O. Green, "Molecular sensing behavior of di-2-pyridyl ketone derivatives". 244th ACS National Meeting & Exposition, Philadelphia, United States, August 19–23, 2012.

- **M. Bakir**; O. Brown, “Molecular sensing behavior of di-2-pyridyl ketone thiosemicarbazone (dpksc) and its rhenium and manganese compounds”. 244th ACS National Meeting & Exposition, Philadelphia, United States, August 19–23, 2012.
- P. Nelson; **H. Ellis**, “Room temperature molecular and lattice structures for a homologous series of anhydrous sodium(I) n-alkanoates”. 244th ACS National Meeting & Exposition, Philadelphia, United States, August 19–23, 2012.
- Debbie-Ann Facey, Robert M Hanson, **Robert J. Lancashire** and Amanda Leone “Visualisation of Chemistry Data with the Open Source software, Jmol and JSpecView H4-2 Data Mining (Part 1): Advanced Data Management and Visualization” CODATA Conference and General Assembly, Taipei, Taiwan, October 28–November 3, 2012.
- Carlton Samuels and **Robert Lancashire** “C5-1 Potential Benefits of OKEs to Developing Countries: the Caribbean Region Experience” CODATA Conference and General Assembly, Taipei, Taiwan, October 28–November 3, 2012.
- **D. Minott**; D. Bremmer, “Polynuclear aromatic hydrocarbons, process contaminants in jerked chicken”. 245th ACS National Meeting & Exposition, New Orleans, United States, April 7–11, 2013.

## PUBLICATIONS

### Refereed Journal Articles

- **M. Bakir**; O. Brown, “Synthesis, and molecular sensing behavior of fac-[Re(CO)<sub>3</sub>(2-N,N-dpksc)Cl], dpksc = di-2-pyridyl ketone semicarbazone”. *Journal of Molecular Structure* 2013, 1032, 118–125
- **M. Bakir**; C. McDermot; T. Johnson, “Spectroscopic, and electrochemical studies of [MCl<sub>2</sub>(2-N,N-dpksc)] (M = Zn, Cd, Hg and dpksc = di-2-pyridylketone semicarbazone”. *Journal of Molecular Structure* 2013, 1040, 221–225.



- P. Nelson; R. Taylor; **H. Ellis**, “The effects of molecular and lattice structures on thermotropic phase behaviour of zinc(II) undecanoate and isomeric zinc(II) undecynoates”. *Journal of Molecular Structure* 2013, 1034, 75–83.
- **W. Gallimore**, “Bioactive Brominated Metabolites from the Natural Habitat and Tank-Maintained Cuttings of the Jamaican Sponge *Aplysina fistularis*”. *Chemistry & Biodiversity* 2013, 10(6), 1055–1060.
- S. Badal; **W. Gallimore**; G. Huang; T. George; R. Delgoda, “Cytotoxic and potent CYP1 inhibitors from the marine algae *Cymopolia barbata*”. *Organic and Medicinal Chemistry Letters* 2012, 2(1), 21–28.
- N. Penicooke; K. Walford; S. Badal; R. Delgoda; L. Williams; P. Joseph – Nathan; B. Gordillo – Roman; **W. Gallimore**, “Antiproliferative activity and absolute configuration of zonaquinone acetate from the Jamaican alga *Stypopodium zonale*”. *Phytochemistry* 2013, 87, 96–101.
- **A. Goldson–Barnaby**; C. Scaman, “Purification and characterization of phenylalanine ammonia lyase from *Trichosporon cutaneum*”. *Enzyme Research* 2013, doi.org/10.1155/2013/670702
- **A. Greenaway**; A. Bucknor; K. Henry; M. Coley, “Identifying possible associations of minor and trace elements with major elements in Jamaican hillside and catchment bauxites using multivariate analysis tools.” *Minerals Engineering* 2013, 53, 124–135.
- O. Barrett; N. Downer–Riley; **Y. Jackson**, “Thermally induced cyclization of electron-rich N-arylthiobenzamides to benzothiazoles”. *Synthesis* 2012, 44(16), 2579–2586.
- **M. Lawrence**; **P. Maragh**; **T. Dasgupta**, “Mechanistic studies on the intra-molecular electron transfer in the adduct species of some oxo-centred trinuclear iron(III)/chromium(III) cations and L-ascorbic acid in aqueous acetate buffer”. *Inorg. Chim. Acta* 2012, 388, 88–97.
- **P. Maragh**, “Mechanisms in solution”. *Annual Reports on the Progress of Chemistry, Section A: Inorganic Chemistry* 2013, 109, 340–359.

- J. Calvente; A. Luque; R. Andreu; W. Mulder; J. Ollolqui-Sariego, “Analytical Expressions for Proton Transfer Voltammetry: Analogy to Surface Redox Voltammetry with Frumkin Interactions”. *Analytical Chemistry* 2013, 85(9), 4475–4482.
- M. McNeil; **R. Porter**; L. Williams, “Chemical composition and biological activity of the essential oil from Jamaican *Cleome serrata*”. *Natural Product Communications* 2012, 7(9), 1231–232.
- Y. Bailey-Shaw; K. Golden; A. Pearson; **R. Porter**, “Characterization of Jamaican Agro-Industrial Wastes. Part II, Fatty Acid Profiling Using HPLC: Precolumn Derivatization with Phenacyl Bromide”. *Journal of Chromatographic Science* 2012, 50(8), 666–672.
- P. Peart; W. Reynolds; F. Williams; **P. Reese**, “The facile bioconversion of testosterone by alginate-immobilised filamentous fungi”. *Journal of Molecular Catalysis B: Enzymatic* 2013, 95, 70–81.
- **M. Singh-Wilmot**; R. Sinclair; M. Andrews; C. Rowland; C. Cahill; M. Murugesu, “Nonanuclear lanthanide(III) nanoclusters: Structure, luminescence and magnetic properties”. *Polyhedron* 2013, 53, 187–192.

#### **WORKSHOPS AND CONFERENCES ATTENDED**

- **Dr. Anthony Greenaway** attended a three-day conference, 10th–12th October 2012 on “Education for Sustainability: International Greening Education Event 2012” in Karlsruhe, Germany.
- **Professor Robert Lancashire** attended the CODATA Conference and General Assembly, Taipei, Taiwan, 28th October 28–November, 2012 as the IUPAC representative.
- **Dr. Marvadeen Singh-Wilmot** attended the 23rd General Meeting and 12th Annual Conference of TWAS, Tianjin, China, September 18–21, 2012.
- Graduate students **April Johnson** and **Stacy-Ann Parker**, **Professor Paul Reese** and **Professor Helen Jacobs** attended a four day advanced training programme, 3rd to 6th December 2012, on Successful

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Technology Licensing (STL) organized by the World Intellectual Property Organization (WIPO) in cooperation with the Jamaica Intellectual Property Office (JIPO) and the UWI Regional Headquarters.

### **INCOME GENERATION & RESEARCH GRANTS**

Income generated from consultation fees, summer school and rental of facilities was approximately J\$10.9M.

The Department of Chemistry was successful in its application for a grant of equipment valued at J\$8M from Seeding Labs. The application was coordinated by **Dr. Petrea Facey**, Research Fellow in the department and **Dr. Julie-Ann Grant** and **Mr. Dale Rankine** of the Faculty Resource Mobilization Unit.

The Departments of Chemistry and Physics working in association with the Youth Crime Watch of Jamaica, which is a campus based Community organization, received a grant of US\$50,000 from the Global Environment Facility (GEF) Small Grants Programme (SGP) to set up a pilot scale biodiesel manufacturing unit to produce biodiesel from waste vegetable oil. **Dr. Michael Coley** coordinates project activities in the Department of Chemistry.

**Dr. Anthony Greenaway** was awarded US\$3000 from the American Society for Limnology and Oceanography (ASLO) for 12 months to support a River Watch project in which pupils at schools in St. Elizabeth will sample and analyse (pH, alkalinity, conductivity, bacteria) water collected from the Black River within the vicinity of the schools.

#### **Professor Paul Reese**

- (a) J\$2,541,438 from the Research Fellowship Committee to fund employment of a Postdoctoral Research Fellow for one year on a project in Isolation of Fungal Natural Products Granted March 2012; Contract period August 2012–July 2013.
- (b) US\$3,145 from the Mona Campus Committee for Research & Publications and Graduate Awards (October 2012) to cover costs

associated with projects entitled “Biotransformation of triterpenes using fungi”.

**Dr. Marvadeen Singh–Wilmot** was awarded a Royal Society Grant of £2,700 for work on metal organic framework materials.

## **PUBLIC SERVICE**

### **Professor T. Dasgupta**

- President, Caribbean Academy of Sciences
- Executive Committee Member, Regional Office of International Council of Science
- Treasurer, Caribbean Community of Sciences
- Member, Organizing Committee of UNITAR Project (Office of Prime Minister)
- Chairman, National Adhering Organization for IUPAC
- Member, International Panel of Academies
- Member, Third World Academy of Sciences

### **Dr. A. Greenaway**

- Deputy Chairman, Jamaican National Agency for Accreditation Technical Advisory Committee, ISO 17025.
- Member, Laboratories Association of Jamaica Proficiency Testing subcommittee.
- Assists teachers to conduct Black River High School’s 6th form Environmental Sciences School Based Assessment research projects which focus on the water quality in the Black River.

### **Professor R. Lancashire**

- Secretary, Caribbean Academy of Sciences.
- Secretary, IUPAC Committee on Printed and Electronic Publications (CPEP).

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- IUPAC representative to ICSU Committee on Data for Science and Technology (CODATA).
- Chair of the Jamaican Research and Educational Network (JREN) Task Group: Applications and Services.
- CODATA Task Group: Preservation of and Access to Scientific and Technical Data in Developing Countries, (PASTD).

### **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 (Science & Technology) – MICO University
- External Examiner for Chemistry – College of Agriculture, Science & Education

### **Dr. D. Minott Kates**

- Member, Jamaican Delegation to the FAO/WHO Codex Alimentarius Commission, 26th Session of the Codex Committee on Processed Fruits and Vegetables (CCPFV), Montego Bay, Jamaica, (October 13–19, 2012)
- Member, National Codex Committee (Codex Alimentarius Commission) Sub-Committee on Processed Fruits & Vegetables (Bureau of Standards Jamaica)
- Member, National Food Standards Committee (Bureau of Standards Jamaica)

### **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.

**Dr. R. Rattray**

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

**Professor P. Reese**

- Jamaica National Agency for Accreditation
- Chair, ISO/IEC 17025 Technical Advisory Committee
- Member, ISO/IEC 15189 Technical Advisory Committee

**Dr. N. Sadler-McKnight**

- External Examiner, Chemistry, College of Agriculture, Science and Education (CASE)
- Member, Technical and Finance Committee of the Scientific Research Council (SRC)

**Dr. M. Singh-Wilmot**

- Member, Organising Committee, New Horizons in Science Symposium