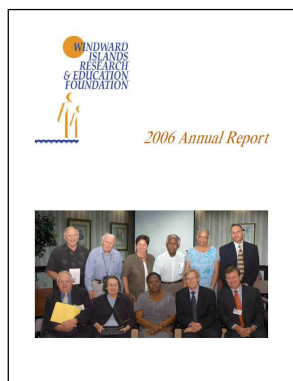
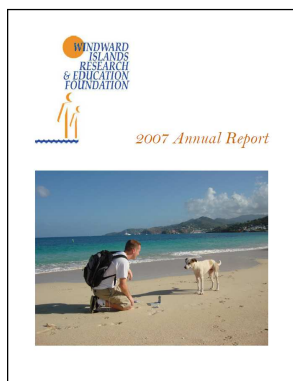
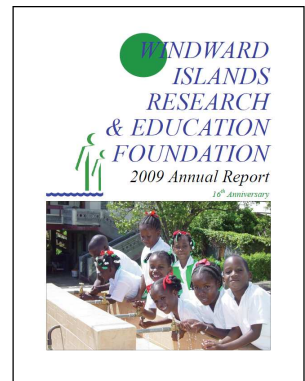
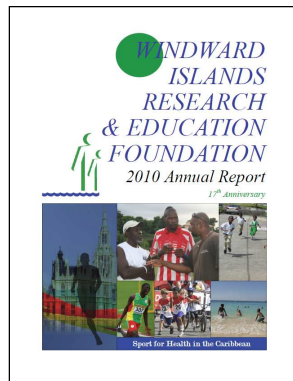
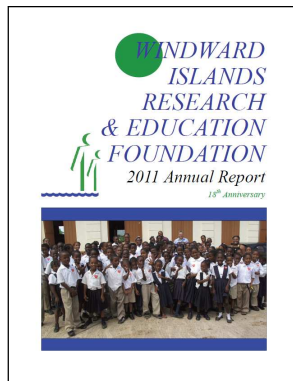
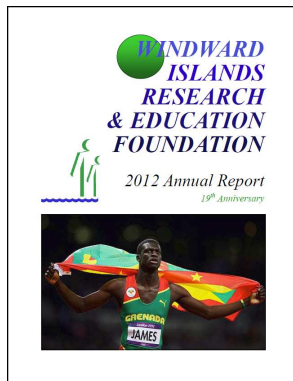


# WINDWARD ISLANDS RESEARCH & EDUCATION FOUNDATION



*2013 Annual Report*

*20<sup>th</sup> Anniversary*



Cover Photo: Celebrating 20 years of research and education work in the Caribbean Region. Covers from previous WINDREF annual reports.



## **Mission Statement**

Founded in 1994, WINDREF seeks to advance health and environmental development through multi-disciplinary research and education programs. WINDREF strives for program excellence by promoting collaborative relationships between internationally recognized scholars and regional scientists, and by adhering to the highest ethical and academic standards in the design and conduct of research.

## **Goals**

- To provide a scientific resource center capable of coordinating international collaborative research of the highest calibre in the areas of medical and veterinary public health, environmental health, anthropology, ecology, marine and terrestrial biology, and ethics.
- To provide a first rate academic opportunity to scientists from the Caribbean and around the world offering unique research opportunities to enhance the knowledge and welfare of local and international communities.
- To conduct applied scientific research for the benefit of community and health development at the local, national and international levels.
- To share relevant scientific information with local and international communities.

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## Section 1 Director's Report on WINDREF Activities in 2013

On behalf of the members of the Grenada \ UK \ USA Boards of Trustees and Directors I would like to thank our collaborators and donors for making 2013 a very successful 20<sup>th</sup> anniversary for WINDREF. This banner year has seen a number of initiatives that have laid the groundwork to support research and education activities in Grenada and the Caribbean Region for many years to come.

First, I would like to thank Lord Soulsby of Swaffham Prior, who stepped down as WINDREF president at the end of 2013. Since 2007, Lord Soulsby provided inspirational leadership and guided WINDREF's further development and evolution. He joined the WINDREF (UK) Board of Trustees from its inception in 1999 and we are fortunate that he has agreed to remain on the WINDREF (UK) Board. Baroness Howells of St. David, who joined the UK Board of Trustees in 2005, was unanimously elected as the new President of



WINDREF UK Board of Trustees Meeting, Langston House, Winchester, UK: 15<sup>th</sup> Nov 2013  
Front row R to L: Calum Macpherson, Neil Poulter, Margaret Lambert, Richard Summerfield, Patrick Orr, Sallyanne George, Lord Soulsby, Baroness Howells

WINDREF. On behalf of all at WINDREF we wish Baroness Howells all the very best for

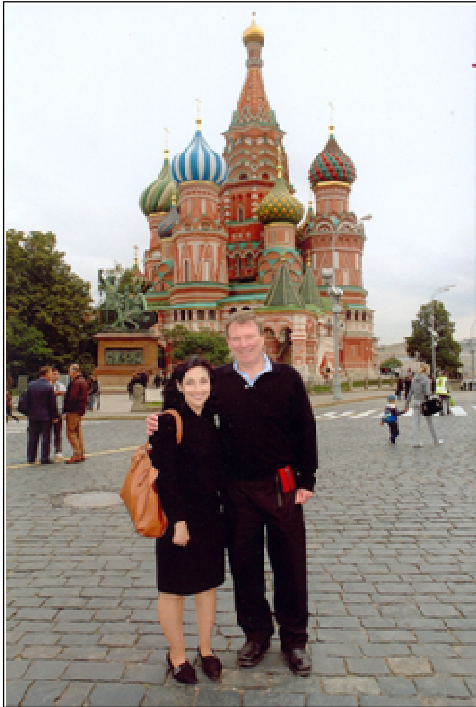
the future and thank Lord Soulsby for all that he has done for WINDREF over the last 14 years.

A number of special events occurred throughout the year. On February 12<sup>th</sup>, Dr. Robert Gallo, discoverer of HTLV and the first diagnostic tests for HIV whose publications in the 1980's and 90's were cited more than any other, visited WINDREF and SGU to present the 5<sup>th</sup> annual Keith B. Taylor / 13<sup>th</sup> annual WINDREF lecture to a capacity audience. Dr. Gallo spent several days on campus, meeting with research scientists, faculty, and students



Dr. Gallo delivering the 13th annual WINDREF lecture and the 5th annual KIB Taylor Memorial Lecture

to discuss his work. His visit initiated the development during the year of a collaborative MOU between WINDREF, the Institute for Human Virology, and the Global Virus Network. In September WINDREF's board member, Ellen Ratner and I attended the Global Virus Network meeting in Moscow. At the meeting we proposed a workshop for journalists on virology which is scheduled to take place in Grenada early in 2014. Given the recent increase in dengue in the region and the first reported cases of the chikungunya virus in the Western Hemisphere in the Caribbean, such a



Calum Macpherson and Ellen Ratner in Russia to attend the Global Virus Network meeting

projects for certified emission reductions. This collaborative effort will see climate experts from the UNFCCC stationed at WINDREF and the DPHPM over the next several years.

Another climate change program initiated towards the end of 2013 was the United Nations Development Program / Global Environment Facility (UNDP GEF) funded *Energy for Sustainable Development in Caribbean Buildings (ESD-CARAIBES)*. This five-nation initiative (Antigua & Barbuda, Belize, Grenada, St. Lucia, Trinidad & Tobago) aims to bring about a 20% reduction in greenhouse gas emissions from the building sector in the five participating countries, through efficiencies and changes in construction methods. WINDREF and the DPHPM will monitor and evaluate the projects in all of the five participating territories. In conjunction with this initiative, WINDREF received a visit from Mr. Stephen O'Malley in November. Mr. O'Malley is Resident Coordinator, Representative and Head of the UN System and UNDP in Barbados and the OECS.

workshop will be timely. We look forward to the many other research and education collaborations with IHV and the GVN.

A number of climate change initiatives were established or moved forward in 2013. This included the establishment of a United Nations Framework Convention on Climate Change (UNFCCC) Regional Collaboration Centre (RCC), in partnership with the Department of Public Health and Preventive Medicine (DPHPM) at SGU. Small island developing states, which compose most of the Caribbean Region, are particularly vulnerable to climate change. Further, these changing weather patterns pose a significant threat to the health and well being of peoples in the Region. The UNFCCC's Clean Development Mechanism promotes reduced carbon emissions by assisting developing nations to earn certified emission reductions, which can be traded or sold to industrialized nations. The St. George's RCC will support governments, NGOs, and the private sector throughout the Caribbean in registering



Visit to WINDREF by Mr. Stephen O'Malley (UNDP). R to L: Randall Waechter, Trevor Noel, Stephen O'Malley, Karla Solis-Garcia, Sohel Pasha, Satish Bidaisee

A number of WINDREF researchers and administrators attended research meetings and conducted fieldwork in 2013. Trevor Noël attended the Pan-American Health Organization (PAHO) meeting on the Schistosomiasis Elimination Program in St. Lucia. Randall Waechter traveled to

Washington D.C. with three research scientists to meet with colleagues and carry out research on the economic value of “cures” for diseases. We look forward to reporting more on this initiative in next year’s annual report. Following the visit to WINDREF by Drs. John Flanigan, Somdat Mahabir, and Damali Martin from the National Cancer Institute (NCI) in 2012, WINDREF put a call out to SGU medical and graduate students regarding a summer training program offered by the NCI. Three SGU students were accepted into the cancer prevention program, and traveled to Bethesda, Maryland for the training during the summer of 2013.

Besides the Global Virus Network



NCI summer training course in cancer prevention attendees: R to L: Katherine Oakley, Avi Bahadoor-Yetman, Amith Ahluwalia

meeting in Moscow, I gave a keynote lecture at the World Association for the Advancement of Veterinary Parasitology (WAAVP) meeting in Perth, Australia, conducted an ultrasound course and its role in tropical diseases in Sudan together with Dr Francesca Tamarozzi, participated in the WHO ultrasound course in Pavia, Italy, and gave an invited lecture to faculty and students at Ege University in Izmir, Turkey. During the year I was appointed to the Research Advisory Committee of the Caribbean Public Health Agency (CARPHA) headquartered in Trinidad. CARPHA’s mission is similar to that of the Centers for Disease Control (CDC) in the US, but for the Caribbean region. It hosts an annual meeting

- formerly the Caribbean Health Research Council (CHRC) meeting - in April/May each year, which attracts participants from around the region and internationally to present their research outcomes.

On the granting front, a number of research projects were initiated in 2013. Dr. Cheryl Cox-Macpherson (Bioethics) and Dr. Muge Akpinar-Elci (DPHPM) received WINDREF’s first ever grant from the Wellcome Trust in the United Kingdom. Their project examined the Bioethics of Climate Change in the Caribbean, specifically focusing on the perceptions of Caribbean Health Professionals regarding the health impacts of climate change, and an extensive review of the bioethics-climate change literature. The goal of the project is to inform public policy and dialogue about the bioethical issues surrounding climate change and health. The Department of Foreign Affairs & International Trade, via the Canada Fund for Local Initiatives, continued to support the revitalization of the nutmeg industry in Grenada via a grant to Dr. Akpinar-Elci. The Bartholomew J. Lawson Foundation, in conjunction with REACH Within, continued to support outreach activities for the most vulnerable children in Grenada through the REACH Institute for Children at SGU. Finally, the International Development Research Centre continues to provide outstanding support for the Grenada School Nutrition Study, which is examining the obesogenic environment around schools in the country. This study entered its second year in 2013, and data collection is scheduled to be completed in the first half of 2014.

In October, WINDREF hosted the US Department of Agriculture (USDA) funded Regional Mite Identification Workshop. The participants included trainees from eight countries throughout the region, who were presented with certificates upon completion of the course.

The eighth annual Mike Fisher memorial award recipient for 2013 was Professor R. C. Andrew Thompson, PhD,



DIC, for his enormous and original contributions to our understanding of zoonoses, particularly *Giardia* spp., *Cryptosporidium* spp. and *Echinococcus* spp. A plaque was presented to Professor Thompson at the WAAVP meeting held in Perth, Australia by Lord Sandy Trees and myself.



Professor R. C. Andrew Thompson, recipient of the 2013 Mike Fisher Memorial Award

We thank all of our donors for supporting the work of WINDREF in this, our 20<sup>th</sup> anniversary year, and look forward to another 20 years of research and education activities in the Caribbean Region.

*Submitted by*

*Calum N. L. Macpherson, Director*

## **Section 2**

### **WINDREF Organization**

#### **2.1 WINDREF Board of Directors**

- Lord Soulsby of Swaffham Prior, MRCVS, DVSM, MA, C.Biol., F.I.Biol., DSc (Hon), (President)
- Calum N.L. Macpherson, PhD, DIC, (Vice President)
- Margaret Lambert, MA, (Secretary/Treasurer)
- Mary Jeanne Kreek, MD, PharmD (Hon), PhD (Hon)
- Karen Lawson, PhD
- Trevor P. Noël, MPH
- Allen Pensick, PhD
- Ellen Ratner

#### **2.2 WINDREF St. Vincent and the Grenadines Board of Directors**

- Ed Johnson, MD, Director
- Sir Fredrick Ballantyne, MD, Deputy Director

#### **2.3 WINDREF Research Institute Scientific Advisory Board**

- Sir Frederick Ballantyne, MD
- John R. David, MD
- John J. Ferguson, MBChB, FRCGP
- Malcolm Ferguson-Smith, MBChB, FRCP, FRCPATH
- Edmond Fischer, DSc
- Sir Malcolm Macnaughton, MD, LL.D., FRCPG, FRAC
- Calum Macpherson, PhD, DIC
- Anselm Hennis, MBBS, PhD, FRCP, FACP
- Oscar Jordan, GCM, MB, ChB, FRCPE, DCH

- Peter Piot, MD, PhD, CMG, FRCP
- Neil Poulter, MD, PhD
- Sir Kenneth Stuart, MD, DSc (Hon)
- Melinda S. Sothorn, PhD, CEP
- M.S. Swaminathan, DSc
- John B. Zabriskie, MD

#### **2.4 WINDREF Research Institute Administration**

Dr. Randall Waechter continued as Grants Administrator, Ms. Isha English continued as Administrative Assistant, Mr. Kareem Coomansingh continued as IRB Administrator, and Ms. Naomi Alexander as Secretary in 2013.

#### **2.5 WINDREF (USA)**

WINDREF (USA) was established as a 501 (c) 3 non-profit organization to facilitate coordination of the USA activities and to administer charitable donations from the United States. Its goal is to enhance the development of WINDREF's research and educational programs. The offices are located on Long Island in the state of New York and provide administrative and logistical support. Ms. Courtney Losito joined the team as Administrative Assistant in New York in 2013.

#### **2.6 WINDREF (UK)**

WINDREF (UK) was set-up as a charitable trust in Winchester, England in 1999 to promote collaboration between WINDREF scientists and academic centers of research in the United Kingdom. It is hoped that by reaching out to a larger scientific community, WINDREF will broaden its research opportunities by forming collaborations with scientists from the European community. A Board of

- Peter Piot, MD, PhD, CMG, FRCP
- Neil Poulter, MD, PhD
- Sir Kenneth Stuart, MD, DSc (Hon)
- Melinda S. Sothern, PhD, CEP
- M.S. Swaminathan, DSc
- John B. Zabriskie, MD

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Trustees was appointed in 1999 to oversee the activities of WINDREF (UK). A Program Coordinator was appointed to provide the administrative support and expertise that is central to WINDREF's (UK) fundraising, administrative and collaborative activities.

## 2.7 WINDREF (UK) Board of Trustees

- Lord Soulsby of Swaffham Prior, MRCS, DVSM, MA, C.Biol., F.I.Biol., DSc (Hon), {Chairman}
- Sir Kenneth Calman, KCB, FRCSE
- Baroness Howells of St. David, OBE
- Lord Stevens of Kirkwhelpington, KStJ, QPM, DL, FRSA,
- Lord Trees of The Ross, DVM, PhD
- Sir Kenneth Stuart, MD, DSc
- Richard Summerfield, MB, BChir
- Neil Poulter, MD
- Mr. Patrick Orr
- Margaret Lambert, MA (Ex Officio)
- Calum Macpherson, PhD, DIC (Ex Officio)

## 2.8 WINDREF (UK) Administration

Ms. Sallyanne George continued to provide administrative support and expertise that is central to WINDREF'S (UK) fundraising, administrative and collaborative activities.

## 2.9 WINDREF Senior Research Fellows

- Hugh W. Ferguson, BVM&S, PhD, Dipl. ACVP, MRCS, FRCP
- Paul Fields, PhD, Brigham Young University
- Paul Garner, MBBS, PhD, Liverpool School of Tropical Medicine
- Mary Glenn, PhD, Humboldt State University
- Duane Gubler, ScD, Hawaii University

- Hugh Sealy, Ph.D., P.Eng.
- Shanti Singh, MD, MPH

## 2.11 WINDREF Research Scientists

Sadiq Al-Tamini, Jonathan Ashcroft, Sumita Asthana, Yitzhack Asulin, Bishara Baddour, Jean-Pierre Barakat, Matthew Beeson, Keith Bensen, Matthew Boles, Karen Brennan, William Brown, Matt Browne, Ella Cameron, Nicholas Caputo, Jessica Clayton, Mmakgomo Coangae, Rae Connolly, Abraham El-Sedfy, Daniel Firer, Scott Forman, Brandon Francis, Vamsi Guntur, François Hallé, Anthony Junck, Megan Kaminskyj, Sebastian Kreitzschitz, Erik Lacy, Ede Langevine, Richard Lehman, Setshidi Makwinja, Paul Mancuso, Baher Maximos, John McCormack, David Melamed, Kirk Minkus, Jerry Mitchell, Jessica Morlok, Kevin Neill, Bayela Nfila, Yolanda Ng, Michael Nillas, Steve Nimrod, Andre Panagos, Rakesh Patel, Barry Politi, Sandeep Pulim, Sean Ramsammy, Justin Rebo, Alan Rhoades, Laura Robinson, Karin Schioler, Corey Schwartz, Sarah Scott, Christopher Skaff, David Steinberg, Derrick Tlhoiwe, Sarah Treter, Nghia Truong, James Tsai, Dan Twyan, Frank Van Natta, Ru-Amir Walker, Juliette Williams, David Winokur, Colleen Wunderlich, Elliot Yung.

## Section 3

### Institutional Review Board Report

The WINDREF Institutional Review Board (IRB) was established in 1994 and subsequently became in 2002 the St. George's University IRB. Research conducted by WINDREF is passed through the SGU IRB and a brief report from the IRB is added here for completeness. The IRB is registered with the United States Office of Human Research Protection, Department of Health and Human Services, and conforms to international standards. Under this registration, institutions are required to protect human participants involved in research whether or not the research is conducted or supported by a US federal department or agency. The Board meets four times per year, usually the 3rd Friday of February, April, October and November. The deadline for the receipt of proposals to be reviewed is two weeks before the meeting. Proposals that meet the criteria for Expedited Review are examined by the Executive Committee within two weeks of submission.

The IRB makes an independent determination about whether to approve or disapprove a protocol. Determinations are based upon whether or not human participants are adequately protected from possible harms including violations of privacy and confidentiality.

Some research that involves human participants may be exempt from the regulations requiring IRB review. Examples include educational testing and surveys that use no identifying information to link subjects to the data, and through which disclosure of data would not reasonably place the participants at risk of civil or criminal liability, or be otherwise damaging to the participant. Also considered for exemption is research that involves the use of existing data, documents, or specimens, where there is no identifying information about participants.

Many institutions' policies stipulate that

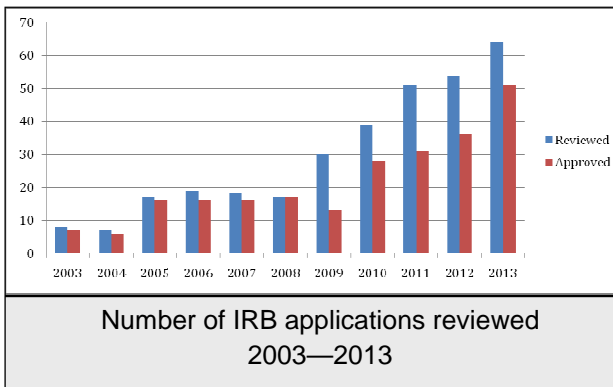
even research that may be exempt is to be reviewed by the IRB prior to classifying it as exempt. The SGU IRB has adopted this policy with the view of preventing the overload of the small pool of research participants available in Grenada, and assuring there is administrative knowledge of research taking place within SGU or Grenada before the work is conducted and findings are disseminated.

The IRB requires that a printed certificate of completion of the on-line training course “Protecting Human Research Participants” is provided to the IRB by all investigators at the time of submission of a research proposal to the IRB. The certification is valid for two years. There is no charge for the course, which is available at the following website: <http://phrp.nihtraining.com/users/login.php>. Alternative protection of human subjects in research courses such as CITI can also be submitted upon approval by the IRB.

In addition to annual summary reports, outcomes of research must be provided to the IRB/SGU Office of Research. Any publications or conference presentations arising from the research should be shared with the IRB/Office of Research, and copies of successfully published work should be provided to the IRB/Office of Research.

### 3.1 IRB Projects Reviewed

A total of 64 applications were submitted to the IRB in 2013. Of these, 51 were approved and 2 were exempted from review. No projects were disapproved. Of the projects that were not approved in 2013, concerns and/or protocol revision recommendations were sent to 11 principal investigators. As of 2013 year-end, the IRB office was still awaiting responses from these investigators.



### 3.2 IRB Executive Committee

#### Members:

- Dr. Robert Hage (Chair), Anatomical Sciences Department
- Dr. Cheryl Cox Macpherson (Vice Chair) Bioethics Department
- Dr. Jennifer Durst (Secretary), Counseling & Psychological Services
- Dr. Theresa McCann (Past Chair), Behavioural Sciences Department
- Sir Paul Scoon, Governor-General of Grenada 1978-1992
- Dr. Calum Macpherson (Ex Officio), Director of Research at SGU
- Ms. Meg Conlon, IRB Administrator, Office of Research, retiring 28 February 2013
- Mr. Kareem Coomansingh, IRB Administrator, starting 1 January 2013

### 3.3 IRB Board Members:

- Mr. Terry Charles, Director, Grenada Red Cross Society
- Mr. Winston Duncan, Director, Grenada Family Planning Association
- Mr. Basil Harford, Retired Civil Servant
- Rev. Raphael Osbert James, Presbyterian Church
- Mr. Alban John, Barrister-at-Law
- Dr. Brenda Kirkby, Behavioural Sciences Department

- Dr. Rohini Roopnarine, School of Veterinary Medicine
- Dr. Muge Akpinar-Elci, Department of Public Health and Preventive Medicine
- Ms. Kathy-Ann John-Sylvester, Assistant registrar, Office of Enrolment Planning
- Mr. James Robinson, Assistant Dean of Students

*Submitted by Kareem Coomansingh  
IRB Administrator, Office of Research*

## **Section 4**

### **Institutional Animal Care and Use Committee (IACUC)**

Federal regulations require that each institution have an Animal Care and Use Program to ensure that all animal welfare laws, regulations and policies are implemented and consistently followed at the institution. The Institutional Animal Care and Use Committee (IACUC) oversees SGU's animal care and use programs, facilities procedures, and ensures the appropriate care, use, and humane treatment of animals involved in research, testing and education. The IACUC is also responsible for establishing guidelines and procedures for animal use and reviewing all animal use protocols, ensuring compliance with federal regulations, inspecting animal facilities and laboratories and overseeing training and educational programs. The IACUC also serves as a resource to faculty, investigators, technicians, students, staff, and members of the SGU community by providing guidance in planning and conducting all animal use procedures in accordance with the highest scientific, humane, and ethical principles.

During the year 2013, seventeen new animal use protocols and 3 renewals were submitted for IACUC review. Seven of the submitted applications were for research, nine were for teaching, and 4 were for wet labs. Of the twenty applications submitted, sixteen were approved, two were withdrawn, and two are pending revisions.

## **Section 5**

### **Current Research Projects**

#### **5.1 Implementing Renewable Energy and Preventing Land Degradation: An Intervention in the Nutmeg Industry in Grenada**

2013 marked the completion of the United Nations Development Programme (UNDP) / Global Environmental Facility (GEF) funded project. Given this milestone, a final report was submitted to the UNDP / GEF, which focused on three project successes regarding the nutmeg industry in Grenada. The first was the Occupational Health and Safety training of the Nutmeg Workers, who faced a number of job hazards. The second involved the implementation of renewable energy for nutmeg processing using a solar dehydrator. The third success revolved around the mitigation of land degradation in nutmeg plantations by increasing biodiversity of flora in the nutmeg fields. Additionally, the project benefitted from an additional \$20,000 CDN in funding from the Canada High Commission in Barbados. This funding supported the training of nutmeg workers in Occupational Health and Safety as well as establishing a Health and Safety Committee for the Gouyave Nutmeg Processing Plant. WINDREF, in partnership with the Department of Public Health and Preventive Medicine (DPHPM), is continuing its partnership with the Grenada Cooperative Nutmeg Association (GCNA) into 2014. This collaboration will involve the establishment of a Spice Research Center for Grenada, as well as an expansion of solar dehydrator technology in the Gouyave Processing Plant and in nutmeg plantations throughout Grenada.

*Submitted by Muge Akpinar-Elci,  
WHO Collaborating Centre on  
Environmental and Occupational Health*

#### **5.2 Needle Stick Injury Prevention Training for Health Care Workers in the Caribbean**

WINDREF, together with the Department of Public Health and Preventive Medicine (DPHPM) at St. George's University (SGU) partnered with the Pan American Health Organization (PAHO) and regional Ministries of Health to establish surveillance of needle stick injury in the Caribbean Region. The train the trainer program included nine Caribbean countries, and identified needle stick injuries and blood borne pathogen exposures as a significant hazard for healthcare workers. These risks were found via workplace assessments of medical practices as well as hospitals and health centers. Interventions through policy reviews, health and safety committees, workplace and work practice reviews and assessments is being monitored for impact through a surveillance system for needle stick injuries among health care workers in the Region. This surveillance program continued in 2013, as the DPHPM monitors the impact of the interventions, the well being of the healthcare workers and the delivery of healthcare in the Region.

*Submitted by Muge Akpinar-Elci,  
WHO Collaborating Centre on  
Environmental and Occupational Health*

#### **5.3 One Health, One Medicine Initiative**

2013 began with a presentation at the 2<sup>nd</sup> International One Health Congress in Bangkok. Multidisciplinary education was a global health focus of the Congress, as well as a review of the global one health approach. Zoonotic disease prevention and control and food safety were identified as critical areas for multidisciplinary collaborations. The year also began with a presentation at the University of the West Indies Conference on Opportunities for Quality Improvement in Emergency

Departments, which was held in Port of Spain, Trinidad. Conference contributors included emergency medicine physicians and administrators from the Eric Williams Medical Sciences Complex, Mt. Hope, Trinidad. The role of veterinary medicine in clinical case management provided a one health perspective to health care delivery services.

A topic of interest that was investigated in 2013 was that of human behavior, climate change and Zoonoses, and specifically, the ethical implications and applications for managing the human and environment interface, which impacts Zoonotic diseases. Together with colleagues from the Department of Bioethics and Microbiology at St. George's University (SGU) and WINDREF, a paper on the Bioethical reflections of the human, environment and Zoonoses interface was published in the Bioethics Caribe journal in February, 2013. Through 2013, WINDREF and the School of Veterinary Medicine (SVM) at SGU also continued its work with the Honey Bee project in Grenada. This included an exploration of the use of antibiotics and pesticides in the management of mite infestation in honey bees as well as investigating the potential of residues in honey and exposure potential for human consumption.

*Submitted by Satesh Bidaisee  
DPHPM, SGU*

#### **5.4 Community Health Initiatives: Sport for Health, Touch Toes Test, Road Safety, Sexual and Reproductive Health Education**

The Sport for Health program was launched by WINDREF in 2010, and continued into its fourth year through the longitudinal study on the use of community based exercise programs to mitigate the effects of chronic diseases. WINDREF continued to role out the Touch Toe Test national campaign in Grenada in 2013, which identifies peripheral neuropathy as a

consequence of Diabetes Mellitus, in an effort to reduce amputations. The activities led to an increase in the number of persons with peripheral neuropathy identified and follow up interventions as part of the Sport for Health program. The Sport for Health program also joined with the University of Michigan, Ann Arbor, School of Public Health, where a quality of life study was conducted among participants in the Sport for Health program. This study served to promote the social and mental aspects of health to complete the physical health focus of the program

The success of the 2012 Touch Toe Test campaign was presented at the 141<sup>st</sup> American Public Health Association meeting in Boston in November 2013. This program will continue in 2014, with the possible submission of a grant to assess the program and role it out in the wider Caribbean Region.

Road safety in Grenada was adopted as a community health project in 2013 in collaboration with the Royal Grenada Police Force (RGPF). An assessment of motor vehicle accidents in Grenada was conducted, which identified geographical locations that serve as hotspots for motor vehicular accidents. Additionally, determinants of age and gender were identified to predispose to motor vehicular accidents. The research and outcomes were presented at the Caribbean Studies Association 38<sup>th</sup> Annual Conference in Grenada in June, 2013.

Emerging from previous reports from school health surveys in the Caribbean, the issue of sexual and reproductive health emerged as a significant public health concern. WINDREF, together with the School of Medicine and the Department of Public Health and Preventive Medicine, reviewed and recommended a curriculum on Sexual and Reproductive Health education for Primary Schools. This report was also presented at the Caribbean Studies Association 38<sup>th</sup> Annual Conference in Grenada in June, 2013.

*Submitted by Satesh Bidaisee  
DPHPM, SGU*



## 5.5 REACH Institute for Children at SGU

In 2013, WINDREF facilitated the establishment of the REACH Institute for Children at St. George's University (SGU), administering funds and advising local programs. The REACH Institute is supported by REACH Grenada, a US-based NGO devoted to serving Grenada's most vulnerable youth and children, particularly those in the nation's five residential care facilities. REACH Grenada, along with its parent organization, Reach Within, was founded by Dr. Karen Lawson.

REACH Grenada provides a number of programs locally, including a Youth Program, facilitated by REACH-trained yoga teachers who provide weekly classes as part of their work as caregivers in the homes; and a Caregiver Education Program, which provides training and support for managers and caregivers in the homes.

In 2013, REACH Grenada provided over 150 weekly youth classes for approximately 80 children living in 5 care homes. Eleven caregivers from the five homes piloted Reach Within's youth yoga program, a social emotional curriculum developed by Lindsay Eagleton, with support from Dr. Lawson and others. Caregivers receive monthly training and support during a Saturday half-day mini-retreat, which takes place at SGU.

REACH Grenada also sponsored eight monthly caregiver education trainings at SGU for over 40 childcare workers and Child Protection Authority staff. They were trained in Conscious Discipline, a social-emotional intelligence curriculum designed to provide parents, teachers, and caregivers with trauma-informed skills for behavior management and for fostering healthy brain development. Conscious Discipline was developed by developmental psychologist Dr. Becky Bailey, and has been taught internationally. It is taught locally by neuropsychologist Dr. Barbara Landon, SGU Bioethics faculty

member. Other REACH staff members (see below) provide coaching in the homes and frequent consultation with caregivers and managers. Dr. Landon supervises the caregiver education effort, as well as other local REACH Grenada programming.

Other REACH programs in 2013 included an August art camp, taught by local artist Stacey Byer, during which residents at three care homes participated in art enrichment activities; the coordination of numerous volunteer and donation programs for island youth; consultation with ministries and other NGOs in Grenada regarding child welfare; co-sponsoring, with the Orphans and Elderly organization and numerous volunteers from SGU student organization, staff, and faculty, an SGU Children's Party for children and caregivers; and involvement of SGU students in service and research work. Current research includes monitoring and evaluating child outcomes, canvassing caregivers for improvements to the Reach Within program, and evaluating implementation of Conscious Discipline via child-caregiver interactions.

Local REACH Grenada staff, in addition to Dr. Landon, include:

- Ms. Lauren Orlando, who coordinates programs, arranges logistics, and manages budgets;
- Mr. Jerry Bascombe, a yoga teacher and caregiver at one of the homes, who coordinates the Youth Program by providing ongoing support to caregivers in the home;
- Ms. Calisha Charles, a Licensed Clinical Social Worker and internationally certified drug and alcohol counselor, who serves as a Conscious Discipline educator and coach in several of the homes;
- Mrs. Lorna Douglas, an expert in youth development through her work at NEWLO, a vocational training school, who also coaches caregivers in several homes.

In 2014, REACH Grenada will continue to provide youth and caregiver programs, and will introduce a program for adolescents, to provide life skills training for young men and women who will be leaving residential care in the near future. It will also continue to partner with community members in the education and social development sectors, both private and governmental.

*Submitted by Barbara Landon  
Dept. of Bioethics, SGU*

## **5.6 Grenada School Nutrition Study**

The Global Burden of Disease (GBD) approach to the quantification of disease risk projects that non-communicable diseases (NCDs) will represent the greatest disease burden in low- and middle-income countries (LMIC) by 2030 (Murray & Lopez 1997; Mathers & Loncar 2006). There is significant evidence to indicate that the onset of NCDs, including cardiovascular disease, diabetes, and cancer, is due to a limited number of modifiable factors in the environment that result in obesogenic diets, lack of physical activity, and tobacco use (WHO 2005; Strong, Mathers et al. 2006). As a result, there exists an expansive literature on the modifiable environmental factors associated with overweight and obesity in high income countries. Numerous interventions have targeted school and physical activity environments, taxes, food marketing, and other aspects of the physical environment (e.g., walkability). Despite the promise of these interventions the prevalence of overweight and obesity in adults as well as adolescents has remained unchanged for over a decade in high income countries. (Ogden, Carroll et al. 2010). The lesson for low- and middle-income countries may be that it is more difficult to modify obesogenic environments once they have been established and population behaviors altered, than prevent those environments from being established in the first place. Adolescence represents one of the critical periods

associated with establishing an obesogenic lifestyle and becoming an obese adult (Whitaker, Wright et al. 1997). In fact, obesity in adolescence is the single strongest predictor of obesity as an adult

The proposed project is designed to target modifiable factors in the environment that lead to obesity among adolescents in the tri-island nation of Grenada. As a low-middle income country, the adoption of obesogenic lifestyles in Grenada is just beginning. There is a window of opportunity to intervene in the trajectory of youth in the country to prevent lifelong obesity and the diseases associated with it. The proposed project plans to take advantage of this window of opportunity and attempt to identify the environmental factors that are currently changing in Grenada.

The specific objectives to accomplish this overall goal include the following:

Objective 1: Conduct structured interviews to identify factors in the environment perceived to be associated with obesogenic lifestyles among adolescents and their parents.

Objective 2: Conduct a secondary school based evaluation and survey of 1,000 secondary students (aged 11-14) identified through a multi stage probability sampling procedure in which the students are nested within 23 secondary schools. The evaluation will include direct measurement of height, weight, waist circumference, skinfold thickness, and accelerometry, to directly assess physical activity. The survey and evaluation will provide individual level data characterizing obesity related outcomes and predictors at both the individual and school level.

Objective 3: Conduct a neighborhood assessment of the 23 secondary school catchment areas to characterize the modifiable food and physical activity in terms of accessibility of healthful and unhealthful food items, and measures of walkability. This effort will be facilitated through the development of a Geographic Information System (GIS) as well as field observation. The GIS and field observations will provide

school level data characterizing factors believed to be related to an obesogenic environment in middle and low income countries.

Objective 4: Conduct multilevel analyses to identify modifiable contextual environments associated with overweight and obesity related behaviors and outcomes. The analysis will be designed to identify the individual and school level factors associated with overweight and obesity in the student population.

Objective 5: Disseminate the study results to policymakers, academics, students, and their parents with the intent of influencing policy that will change the environmental contexts associated with an obesogenic lifestyle. The dissemination efforts will be designed to develop evidence based policy to reduce obesity in middle and low income countries.

The project is on schedule to meet the targeted objectives within the original timeline, and the scope has not changed. The focus of the second project period (2013) was to carry out a pilot study, identify Caribbean-based research assistants, recertify/ train the research assistants in data collection and research methodology; conduct a survey and measurement search; conduct a questionnaire assessment, selection, and modification; clear research ethics; and collect data. The random selection process of study participants was completed. The participant informed consents were circulated, signed and returned. The recertification/ training of the eight appointed research assistants, all of whom are Grenadian citizens, reflects the significant research capacity building that was achieved in the first year of the study.

The overall methodology has not changed, but we did modify some of the specific measures to ensure cultural sensitivity. The questionnaires were modified to include local food dishes so that the study participants are better able to document their eating habits.

A pilot study was conducted in May

2013. The following activities were accomplished during this pilot study: (1) testing of the questionnaires; (2) assessing the competency of the research assistants in collecting data; (3) collection of data from one school; (4) creation of a database for the storage and analysis of data. All of these activities involved on-going training for research assistants involved in the study. For example, the research team developed complex scheduling and time management skills, identified limitations in the protocol, and made recommendations to enhance the study design (See Appendix 1: Pilot Study).

As of the writing of this report, 1,200 consent forms have been distributed across 23 secondary schools. 740 forms have been signed and returned with consent. 30 forms have been returned with refusal. This represents a 64% response rate (to date) and 96% study consent rate among respondents (to date).

Three out of twenty-three (13.0%) of the secondary schools were visited during the months of September and October. Data was collected from 93 study participants (54.8% males and 45.2% females) and accelerometry data was been collected from 24 study participants. Participant fall-out from the study has been estimated at a rate of 1-2 participants per school. Thus an overall study population of 700 and an accelerometry study population of 250 are likely to be achieved.

Activities planned for the second year of the study include: (1) on-going recruitment and data collection from youth participants, (2) the creation of a database that will allow for tracking the study participants in the future and (3) the processing and analysis of study data.

The study is expected to have an impact on knowledge, attitudes, behavior, and practices among a number of groups, including Grenadian parents, teachers, policymakers government and non-government agencies. In order to have an impact, the results of the study must be effectively disseminated to key stakeholders.

WINDREF and the Department of Public Health and Preventive Medicine at St. George's University have extensive experience in public health education campaigns. Furthermore, the results of any relevant study conducted through WINDREF are always distributed to the appropriate government agencies and officials, as per its Mission Statement.

In summary, the project is running on schedule and we anticipate every success in both information gleaned regarding obesogenic lifestyles among Grenadian youth and research capacity building in Grenada and the Region. We thank the IDRC for its on-going support and look forward to year two.

*Submitted by Roger Radix  
DPHPM, SGU*

### **5.7 Genetic Correlates of the Addictive Diseases: Cocaine, Alcohol, and Marijuana Addiction in Grenada, West Indies**

In Grenada, blood samples are taken from normal volunteers, drug-free former cocaine users, drug-free former marijuana users, drug-free former alcohol users, or current drug and alcohol users. To assess their levels and types of addiction, a standard scale – developed by the Kreek Lab – is used for each patient, called the KMSK scale.

The KMSK scale is a brief survey that is 90-100% effective in screening for alcohol, marijuana, cocaine and heroin addiction. This scale is used for all patients studied in the Kreek Lab. The patients are also asked about their family origin, as this information may play a role in further genetic studies done by the Kreek Lab.

To date 53 case participants have completed the full KMSK questionnaires and blood draws in Grenada. Our control participant's selection is ongoing and we have completed 91 control samples. The samples and KMSK and family origin questionnaires



Trevor Noël, Elizabeth Japal, (Assistant Drug Control Officer), Mary Jeanne Kreek (Rockefeller University), Calum Macpherson

that are administered are sent to Rockefeller University (New York) where they are analyzed.

In the past, our research nurses, have included Nestar Edwards (Chief Nursing Officer for Grenada), Beverly Mendis and Kathleen Collier, Nurse Idis Mark-George. Recent talks have been held to include nurses from the St. George's University School of Nursing. These nurses have been entrusted with the process of receiving a signed informed consent form and drawing the blood and administering the Family Origin Questionnaire and the KMSK scale to the participants.

The Kreek Lab collaborates with WINDREF in Grenada in an effort to gain a better understanding of the biology of addictive diseases, particularly the genetic basis of addiction. Grenada provides a unique study sample as heroin and other such opiates have yet to enter the country. In most countries, opiate and cocaine addiction is rampant and sometimes may go hand in hand. Thus, the Grenada study acts as a control for any heroin-cocaine addiction comorbidity observed in previous genetic studies of addicts.

Whole blood samples taken from subjects in Grenada are shipped to the Kreek Lab at Rockefeller University for DNA isolation. The DNA is further analyzed by lab members who look for any polymorphisms – variations in DNA – that may occur in specific

regions of the DNA: mu and kappa opioid receptor genes being two of the many.

Projects of a similar nature are being run in several other areas of the world, including Stockholm, Lund, and Uppsala in Sweden, Oslo in Norway, Tel Aviv in Israel, and Las Vegas in Nevada, Oakland in California, New York City in New York, USA.

Trevor Noel is the WINDREF representative on the Grenada Drug Intervention Network (GREN DIN), which celebrated its tenth anniversary in December and we continue to work closely with Drug Avoidance Officers from the Ministry of Education. Both WINDREF and Rockefeller University have been collaborating with the Drug Avoidance office on this project for ten years.

*Submitted by Trevor Noel  
Assistant Director, WINDREF*

### **5.8 Caribbean University Interdisciplinary and Integrated Drug Demand Reduction Project**

Progress continues on the Drug Demand Reduction Project. Over the past year, the link with the Grenada Drug Epidemiology Network (GREN DEN) was strengthened so that we can optimize our collaborative efforts on community outreach drug prevention programs, especially among young people. The involvement of Dr. Shelly Rodrigo from the SGU Masters of Public Health (MPH) program as Co-Principal Investigator has led to the involvement of MPH graduate students in various aspects of the training, research and evaluation of project activities.

During the first half of 2014 we plan to expand the Project Advisory Committee to include representation from the Ministry of Youth Empowerment and Sports and to add the expertise of a specialist who has been working with young offenders and substance abusers whom the court has mandated into a behavior modification program. Focused

research activities will commence in the summer 2014 session of the MPH program.

*Submitted by Beverly Bonaparte  
Dean of Nursing, SGU*

### **5.9 Bioethics of Climate Change**

Thirty physicians, pharmacists, students, and members of the Bioethics Society of the English-speaking Caribbean (BSEC) participated in a symposium exploring regional health impacts of climate change on November 16, 2013. The symposium was designed to explore the significance of data obtained during the study *Bioethics and Health in the Caribbean: Climate Change* conducted by Principle Investigators Cheryl Macpherson and Muge Akpinar-Elci. The study examined the perceptions of Caribbean doctors, veterinarians, and other health professionals regarding health impacts of climate change in their respective nations. Data was obtained through focus groups in Grenada and Trinidad, analyzed by three independent reviewers, and presented during BSEC's Annual International Forum hosted by SGU's Bioethics Department that day.

After a welcome from Dr. C. Macpherson, the renowned bioethicist and environmental ethicist Dale Jamieson (Professor, Environmental Studies and Philosophy & Director, Animal Studies Initiative, New York University) facilitated discussion of whether Caribbean or other bioethicists have a responsibility to address the health impacts of climate change. Participants distinguished between actions that cause climate change and the challenges of responding and adapting to the regional health impacts. Also discussed was the extent to which our own individual carbon emissions contributed to the catastrophic typhoon Haiyan in the Phillipines, and the role of economic development in causing, and adapting to, climate change in the Caribbean.

Much discussion centred on economics and poverty. Participants perceived conflicting values and priorities within their countries which lead them to prioritize short term economic benefit over long term protection and stewardship of their environmental resources. Because those who cannot afford to feed their families have more immediate concerns than climate change, participants noted the need for nations to address poverty.

Over dinner funded by the Wellcome Trust, symposium participants worked in groups to answer a set of questions about their perceptions of the significance and applicability of the focus group data to their own nations which included Jamaica, Trinidad, and Grenada. Verbal reports from rapporteurs confirmed that symposium participants agreed with most perceptions of focus group participants, particularly about the increase of mosquito borne diseases in their nations and the widespread practice of burning waste which generates carbon emissions.

The symposium concluded with plenary discussion led by Sean Philpott, Director of the Bioethics Program at Union Graduate College, who helped participants brainstorm possible roles and ways forward for Caribbean bioethicists. The most engaging topics discussed were i) to deal with poverty and ii) to elicit policy to create incentives for alternative energy and technology. The views expressed during the symposium will guide the investigators in preparing the focus group data for publication in a peer reviewed journal. Their interdisciplinary collaboration models a role for bioethics in policy dialog regarding health, climate change, and development. To their knowledge, no similar work has been conducted in the Caribbean or other small island developing states.

On the granting front, Dr. Philpott, Dr. Robert Hall and Dr. C. Macpherson submitted a large grant application to the National Institutes of Health (NIH) in late 2013 titled: "Caribbean Research Ethics Education

Initiative (CREEi). The application, which has received favourable initial feedback from NIH reviewers, proposes to build on an existing successful distance-learning program in Eastern Europe that provides a Masters of Science in Bioethics and its web-based Advanced Certificate Program. By partnering with St. George's University (SGU) and the Universidad Autónoma de Querétaro (UAQ) in Mexico, Union Graduate College (UGC) proposes to develop and deliver graduate level online and onsite programs in research ethics for the Caribbean Basin. As such, the purpose of this program is to build capacity in research ethics in the 21 independent low- and middle-income countries that border the Caribbean Sea. The use of a hybrid online/ onsite approach means that most trainees will be able to receive in-depth comprehensive graduate education in research ethics without leaving their jobs or their home countries. Of the students completing the Diploma program, four will be offered a scholarship to go on to complete the online Masters of Science in Bioethics at UGC. The partnership will also create the infrastructure to support the four cohorts of English- and Spanish-speaking students, train and mentor faculty from the Region who can continue these training programs once the funding period ends, provide public online resources on research ethics for the Caribbean Basin, and develop SGU and the UAQ as regional centers of excellence in bioethics and research ethics. We hope to receive positive news from NIH regarding funding for this program in early 2014.

*Submitted by Cheryl Cox-Macpherson  
Dept. of Bioethics, SGU*

## **5.10 United Nations Framework Convention on Climate Change (UNFCCC) St. George's Regional Collaboration Centre (RCC)**

The St. George's Regional Collaboration Centre\* (RCC) St. George's is a joint effort

between the Sustainable Development Mechanism (SDM) programme of the United Nations Framework Convention on Climate Change (UNFCCC), WINDREF, and the Department of Public Health and Preventive Medicine (DPHPM) at St. George's University (SGU). The St. George's RCC began operations in July 2013. The centre's aim is to support Caribbean stakeholders to participate in the carbon market while mitigating climate change effects. In order to do so, the St. George's RCC provides technical aid on how to integrate clean technology activities into the carbon market via the Clean Development Mechanism (CDM) of the Kyoto Protocol\*\*.



\* So far there are four RCC offices, all of which started operating in 2013. The three other centres are based in Lomé, Togo; Kampala, Uganda; and Bogota, Colombia. They work in collaboration with the Banque Ouest Africaine de Développement; the East African Development Bank; and the Corporacion Andina de Fomento, respectively.

St. George's RCC operations are managed by Dr. Karla Solis (Team Lead) with the support of Mr. Sohél Pasha (Technical Officer) and Mr Nigel Edwards (Technical Assistant). Dr. Hugh Sealy and Mr. Andrew Cutz (DPHPM) and Mr. Trevor Noël, (WINDREF) serve as Advisors to the centre. Dr. Solis and Mr Pasha have been assigned from SDM-UNFCCC to St. George's. Mr Edwards works for the DPHPM and supports the centre on a part-time basis. Dr. Randall Waechter (WINDREF) is the Budget Manager of the Centre. An RCC Steering Committee oversees the implementation of the Centre, and is composed of two members from SDM-UNFCCC Project Management Team; Mr. Conor Barry and Mr. Luca Brusa; and one member from WINDREF, Dr. Randall Waechter.

\*\* The CDM is a carbon market tool provided by the Kyoto Protocol to reduce greenhouse gas emissions

During the first six months of operation the Centre focused on four activities: (1) stakeholder engagement, (2) support project participants on the CDM project cycle; (3) developing a CDM package for renewable energy and waste management sectors; and (4) providing policy input to the CDM Executive Board in ways to improve the CDM project cycle. This focus has led to the following outcomes:

#### 1. Stakeholder engagement

Purposed Missions: Ten missions have been carried out to Barbados (4), Dominica, Aruba, Belize, Trinidad, Dominican Republic and Mexico. The missions provided the opportunity to meet with government and private stakeholders and to present St. George's RCC activities to wider audiences by participating in conferences/seminars on renewable energy, waste management and / or carbon market development:

Pasha, S. (2013). The Regional Collaboration Centre St. George's. Caribbean Sustainable Energy Road Map and Strategy Resources Mobilisation Forum. Barbados.

Solis, K. (2013). Climate Finance as an Instrument to Enhance Renewable

Energy Technologies. CARILEC Renewable Energy Regulatory Forum. Barbados.

Solis, K. (2013). Achievements of the CDM: Past, Present and Future. 4th National CDM workshop and Multilateral Environmental Agreements. Trinidad.

Solis, K. (2013). Carbon trading for Caribbean Hotels. Caribbean Tourism - The Energy Forum. Dominican Republic.

A St George's RCC directory with more than 300 entries has been set up in the UNFCCC share point tool.

Capacity Building: The St. George's RCC designed and delivered a CDM technical workshop on Standardized Baselines for the Electricity Sector in Santo Domingo on 6<sup>th</sup> December 2013. The workshop was coordinated by the Climate Change Commission of the Dominican Republic. The aim of the workshop was to share with participants how to apply the standardized baselines approach to estimate the emission factor of the electricity grid of Dominican Republic.

The St. George's RCC developed four CDM related technical flyers to enable a better communication flow with stakeholders. The flyers are called: Designated National Authorities aimed to government representatives to the CDM-UNFCCC; CDM project cycle; Standardized baselines cycle and Standardized baselines for the electricity sector.

Engaging with the Government of Grenada: The St. George's RCC participated in the CARICOM Energy week organized by the Energy Division of the Grenada Ministry of Finance. This participation included a TV interview with the Grenada Information Service and with an exhibition booth.

## 2. CDM project cycle

Caribbean project participants of 63 activities in the initial, validation, and registration stages of the CDM project cycle have been contacted. Three (3) initialization letters have been drafted for project participants in the Dominican Republic (2) and Barbados (1).

## 3. CDM package for renewable energy

Individual collaboration agreements between the World Bank Institute, UNEP-Risoe, Inter-American Development Bank and the St. George's RCC have been established to support renewable energy activities in the region. The specific objectives of integrating efforts are to promote a solar regional programme, to establish grid emission factors for countries (the factor is a key step that allows estimating emission reductions) and to support renewables in the hospitality sector.

## 4. Policy Input for the CDM Executive Board

This work will get underway in 2014.

*Submitted by Karla Solis-Garcia,  
UNFCCC CDM Officer & Representative,  
St. George's RCC*

## 5.11 Renewable Energy and Energy Efficiency (REEF) Initiative

The research activity in 2013 centered around my responsibility as a lead negotiator for the Alliance of Small Island States (AOSIS) in the climate change talks under the United Nations Framework Convention for Climate Change (UNFCCC) and as a consultant to the World Bank.

As a CC negotiator I worked on an AOSIS proposal (September, 2013) to



increase global mitigation action in the period 2013 – 2020. The proposal focuses initially on a collaborative technical effort to identify yet untapped mitigation potential in both developed and developing countries particularly in the areas of energy efficiency and renewable energy. Through a work plan established at COP 19 in Warsaw in November 2013, it is anticipated that a number of scalable pilot projects will be identified and implemented with funding provided through the Green Climate Fund expected to be capitalised at ~US\$100 billion/year by 2020. It is hoped that, through this AOSIS proposal, the world can begin to close the emissions gap estimated at 8 - 12 giga tonnes of carbon annually.

In 2013, as a consultant to the World Bank, I researched the feasibility of developing a first-of-its-kind regional Nationally Appropriate Mitigation Action (NAMA) for the Caribbean using solar PV technology. The feasibility report was completed in October 2013. A NAMA is the term given by the UNFCCC to a national submission that could be policies, programmes or projects that reduce greenhouse gas emissions. The submitting country requests support for its NAMA through registering it with the UNFCCC. In Phase 2 (2014), it is anticipated that a framework regional NAMA will be submitted requesting a minimum of US\$100M in finance, technology transfer and capacity building for wide scale deployment of solar PV technology within CARICOM.

*Submitted by Hugh Sealy,  
DPHPM, SGU*

### **5.12 Soil Transmitted Helminths and *Streptococci* infections among school going children between the ages of 5- 15 years old in the Parish of St. Andrew's**

This research project is a two part

study. The first component is the streptococcal portion being conducted in St. Andrew's parish, Grenada. This component is investigating the incidence of Streptococci infections among school going children between the ages of 5-15 years old in the Parish of St. Andrew's. The second component focuses on the Incidence of Neglected Tropical Diseases (NTDs) with a specific emphasis on the "Soil Transmitted Helminths" with the aim to eliminate the three main helminths, hookworms (*Ancylostoma duodenale*, *Necator americanus*), Roundworms (*Ascaris lumbricoides*) and Whipworms (*Trichuris trichiura*). The second component of this study has evolved into an larger elimination program for all of Grenada, Carriacou and Petite Martinique.

The streptococcal portion has all fourteen (14) Primary schools in the parish of St. Andrew's included in the study: Belair Government, St. Matthew's Roman Catholic (R.C.), St. Michael's R.C, Holy Cross R.C., Holy Innocent Anglican, St. Giles Anglican, St. Mary's R.C., Telescope Government, Paraclete Government, St. Andrew's R.C., St. Andrew's Methodist, Tivoli R.C. St. Andrew's Anglican and Crochu R.C. Rheumatic Fever is as a result of exposure to *Streptococcus pyogenes*. The sequelae of this can lead to Rheumatic heart disease. Rheumatic heart disease is a debilitating condition that is usually brought on by stenosis of the mitral or aortic valves.

The anticipated sample size for this study was 750 children. Throat and blood samples were observed in the laboratory for Streptococci. A total of 585 blood samples and 360 throat samples were collected by the community nurse and physician. The school children were randomly selected and were between the ages of 5 – 15 years old.

The protocol for this study was passed and approved through St. George's University IRB and subsequently passed and approved by the Research Oversight Committee at both the Ministry of Education and the Ministry of Health. Eleven hundred informed consent

forms were distributed to the schools mentioned above. In each school, the distribution was random with the classes being selected using a random number generator. We received 729 signed informed consent forms, and 698 completed knowledge, attitudes, behavior, and practices (KABP) questionnaires. In total, 590 blood samples and 590 throat samples were collected and analyzed.

The blood samples were subjected to Anti streptolysin O titres tests and the throat swabs to cultural isolation for *beta hemolytic streptococci*. Positive *beta hemolytic streptococci* samples are currently stored in the WINDREF Institute in Grenada and will be sent to Rockefeller University and the University of Minnesota for further subtyping. The Streptococcal sample collection component of the study began in May 2010 and was completed in January 2012. In addition to this testing, there was an educational component that provided and continues to provide primary prevention via multimedia campaign. The educational component of the study was begun with the initial sensitization of the community nurse and educational workers.

The positive sera samples for anti – bodies to streptococcal infection (% ASOT +) and throat swab cultures positive for beta hemolytic *streptococci* infection can be seen in Table 1. The prevalence results of this sample averaged 6.3% positive ASO Titre and 12.1% positive combined *Beta Hemolytic Streptococci*. Preliminarily, these rates appear to be lower than those that were done nationally in the 2000 – 2002 study. However, these rates will be carefully compared with the previous study and discussed in the PhD thesis.

All positive cases were seen by the physician and treatment was given by the community nurse and physicians (both from the St. Andrew's area) at the schools or at decentralized clinics in the community. The medication (penicillin/erythromycin) was purchased by WINDREF through Parris Pharmacy in Grenville. We chose this

pharmacy because it is owned by Mr. Reginald Buckmire, PhD (a St. Andrew's Parish based businessman). This meant that all the persons that took responsibility for the persons in this area were from St. Andrew's leading to a strong sense of ownership and empowerment.

SCHOOL	Positive ASO Titre %	Positive Combined $\beta$ HS %	Total Students
Belair Government	9.8	6.6	61
St. Matthew's R.C.	4	10	50
Telescope Government	13	6	54
Paraclete Government	11.1	7.4	27
St. Andrew's Anglican	0	6.9	29
St. Michael's R.C.	4.3	19.6	46
Holy Cross R.C.	6.1	12.2	49
Holy Innocent Anglican	4.8	11.3	62
St. Giles Anglican	0	17.1	35
St. Mary's R.C	6	39	33
Crochu R.C.	2.6	12.8	39
St. Andrew's R.C.	0	4	25
St. Andrew's Methodist	23.7	15.8	38
Tivoli R.C.	2.4	0	42
Total	6.3	12.05	590

**Display of streptococcal survey for St. Andrew's schoolchildren 5 – 15 years in 2010 - 2012**

The second portion of this study focuses on the Incidence of Neglected Tropical Diseases with a specific emphasis on the "Soil Transmitted Helminths" with the aim to tackle the three main helminths, The second component of this study has been increased from only the St. Andrew's area to be part of an elimination program for Grenada, Carriacou and Petite Martinique. From an ethical perspective, the elimination program was approved by the St. George's University IRB and the Research Oversight Committees of both the Ministry of Education and Ministry of Health (Grenada) for the St. Andrew's area and most recently at the



Examples of stool samples prior to testing (left) and toilet facilities at one of the participating schools (right).

national level (Grenada, Carriacou and Petite Martinique).

The evolution of this project from solely the St. Andrew's area, to be a Grenadian National elimination program has resulted in a revision of the sample size and an increase from 14 to 58 schools involved. On the advice of our statistician forty one of the fifty eight primary schools have been selected for inclusion in this study and if a



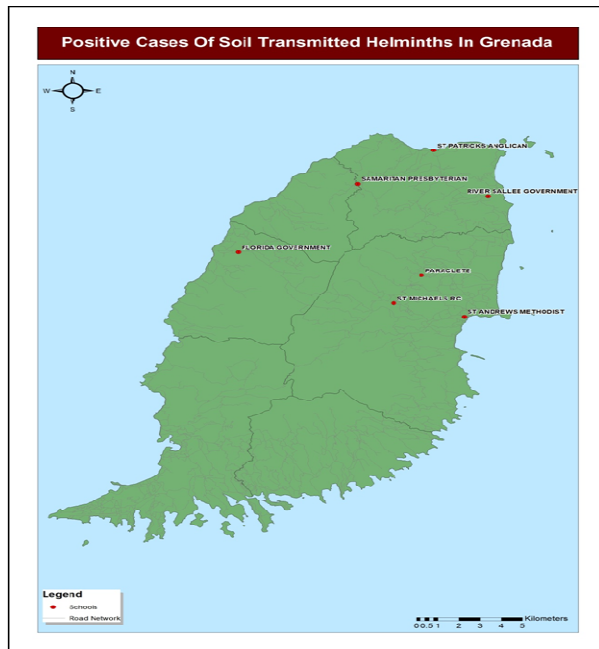
Positive study participants receiving treatment at the school and in the community.

grade/standard is selected all members of that grade/standard will be given the opportunity to participate regardless of class size to adhere to ethical soundness. The fecal samples obtained will be analyzed using salt flotation.

The 1,100 informed consent forms and knowledge, attitudes, behavior, and practices (KABP) questionnaires were distributed to the 41 schools. They were disseminated by the school principals to the parents/guardians. These informed consent

forms and knowledge, attitudes, behavior, and practices (KABP) questionnaires had already been pilot tested in the fourteen St. Andrew's schools. The Incidence of Soil transmitted helminths was ascertained and we investigated the possible correlation of these results with the KABP questionnaire. The pharmaceutical company, Glaxo Smith Kline along with the World Health Organization (WHO)/ Pan American Health Organization (PAHO) have promised the drug, albendazole free of cost for three years for this elimination program.

We received a total of 522 stool samples from Grenada, Carriacou and Petite Martinique. These stool samples were



Map of Grenada displaying the location via GPS of positive cases of Soil Transmitted helminthes.

analyzed using the Zinc Sulphate flotation technique. Eight (8) positive cases were discovered by this method. The positive subjects seen in Figure 2 were treated in one day using albendazole that was available over the counter from a local pharmacy.

We are in the process of carrying out contract tracing in the homes and surrounding locations of the positive cases. The map of

Grenada below displays the location of our positive cases. They are all in the rural area of mainland Grenada. There were no positive cases from Carriacou or Petite Martinique. The educational component continues in that we continue to maintain the printed posters for sensitization purposes in all the Primary and Secondary schools in Grenada, Carriacou and Petite Martinique.

The hope is to conduct a mass drug administration of albendazole in two parts and then to conduct a final survey to see if effective control has been achieved. The initial funding for this two-part study was provided by the Bartholomew J Lawson Foundation through REACH (GRENADA). This NTD project is incorporated as part of the wider WINDREF vision of the Sport for Health Program.

*Submitted by Trevor P. Noël  
Assistant Director, WINDREF*

### **5.13 Genetic Diversity and Antibiotic Resistance of Clinical and Non-clinical Isolates of *Escherichia coli* in Grenada**

Hospitals have taken steps to prevent drug-resistant infections, but less is known about preventing infections outside hospitals, clinics and nursing homes. There has been little research, for example, on the extent to which food sources, water, or antibiotic use on industrial farms contributes to resistant germs in people. The farm animal industry has been reluctant to allow data collection, and very few studies of the link have been done. Therefore, the food product offered for purchase requires testing for presence of antibiotic-resistant bacteria.

Annually there are 8 million cases of Urinary Tract Infections (UTI) in the United States and over 150 million cases worldwide with the primary source of these infections being *E. coli*, and specifically extraintestinal

pathogenic *Escherichia coli* (ExPEC). In the past decade there has been a noted increase in the incidence of drug resistant *E. coli*, resulting in more complicated and costly treatment if UTIs. It was acknowledged by the Center for Disease Control (CDC) in September 2013 that 23,000 individuals die annually from drug resistant infections. *E. coli* exhibits multi-drug resistance with the prevalence of antimicrobial resistance among the human clinical isolates of *E. coli* dramatically increasing in recent years. This is of importance as with resistance to antimicrobial agents there is now an increased reliance on broad spectrum antimicrobial agents. This leads to increasing resistance to these broad spectrum antibiotics as well as the subsequent generations of these drugs. This correlates to an NBC report in 2010 that stated that an aggressive strain of multi-drug-resistant *E. coli* bacteria, named *E. coli* ST131, could be responsible for up to 1 million bladder infections and more than 3,000 deaths a year from infections that started out in the urinary tract.

In Grenada there has been only one study that investigated *E. coli* and antibiotic resistance patterns. This study was based on phenotypic identification of *E. coli* from both marine isolates and UTIs infected patients' urine as well as a comparison of their antibiotic resistance. This study demonstrated that *E. coli* from marine isolates displayed similar antibiotic resistance patterns as uropathogenic isolates from clinical samples.

It is important to study the antibiotic-resistance patterns of *E. coli* in Grenada, as an increased incidence of antibiotic resistance may result in increased hospitalization and healthcare costs as well as the possibility of morbidity and mortality. Additionally, the SGU clinic, which treats both local and foreign patients, has encountered multi drug resistant UTIs.

We hypothesized that *E. coli* from environmental sources is genetically related or identical to clinical isolates of *E. coli*. So, the aim of this study was to determine the prevalence and genetic diversity of antibiotic

resistant *E. coli* in number of animal and environmental sources and in UTI patient samples in Grenada. We also plan to determine if there is a link between the observed genotypes (using the REP PCR) and patterns of antibiotic-resistance of *E. coli* isolated from animals (dogs, iguanas) and from the environment (seawater) and of *E. coli* isolated from urine of the UTI patients.

Our research objectives include the following:

- Creation of *E. coli* culture collections from clinical (30) and non-clinical sources (72)
- Strain identification and comparison of *E. coli* isolates using DNA fingerprinting methods.
- Strain identification and comparison of *E. coli* isolates with worldwide virulent isolates using serotyping.
- Determination the antibiotic resistance of each *E. coli* species isolate
- Comparison of the genotypes, serotypes and antibiograms of newly isolated *E. coli* with the organisms from earlier established culture collection from human urine (30) and non-clinical sources including marine water (30), Grenadian dogs (25) and iguanas (17).

The spread of pathogenic bacteria that are resistant to certain antibiotics constitutes a growing threat to public health. One strategy to counter this problem is to minimize the probability and spread of antibiotic resistance. To achieve this we need to understand the sources of antibiotic resistance in the environment. Thus, the aim of this study is to determine the occurrence of antibiotic resistant *E. coli* in the sea water, animals, variable food sources including meat of chicken, beef, pork, green salad and in UTI patient samples in Grenada. We also plan to determine if there is a link between the isolated bacteria at the genetic level (ERIK/BOX/REP PCR) and between observed patterns of antibiotic-resistance against the drugs that are commonly used in Grenada.

This research has a number of

important implications for public health and the identification of the antibiotic-resistance typical for virulent bacteria isolated from patient samples in Grenada. Antibiogram of a pathogen specifies which drugs (antibiotics) may kill the particular microbe and which drugs might not. The antibiogram could be made available from to the Ministry of Health and medical doctors in Grenada and to any SGU professor for teaching in microbiology, clinical skills or pharmacology as educational material on susceptibility patterns of bacterial pathogens in Grenada.

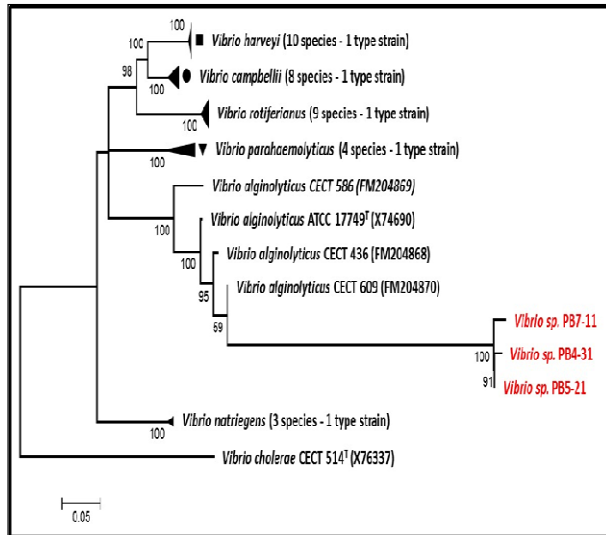
This research project will be performed as a collaboration between the SOM, SVM, Clinical Testing Unit, ETU and SGU clinical Services. A wide inter-institutional collaborative network will allow for sharing of bacterial isolates from culture collections, saving time and resources.

*Submitted by Svetlana Kotelnikova & Karla Farmer, Dept. Microbiology, SGU*

#### **5.14 Phylogeny and Evolution of Housekeeping Genes in Marine *Vibrio* Isolated from the Caribbean Sea, Grenada**

*Vibrio* species are considered a major food borne pathogen in the USA with a substantial health burden. The halophilic Gram-negative curved rod *Vibrio* genus is comprised of at least 98 known genotypically distinct species. *Vibrio* infections (vibriosis) can occur through exposure to the seawater, marine animals, the consumption of contaminated seafood and/or drinking water. Further, climate change potentially contributes to the risk of being infected with *Vibrio* upon exposure to seawater. Marine *Vibrio* including *V. harveyi*, *V. campbellii*, *V. rotiferianus*, *V. parahaemolyticus*, *V. alginolyticus* and *V. natriegens* are difficult to differentiate biochemically, morphologically and genotypically using only the 16S rDNA

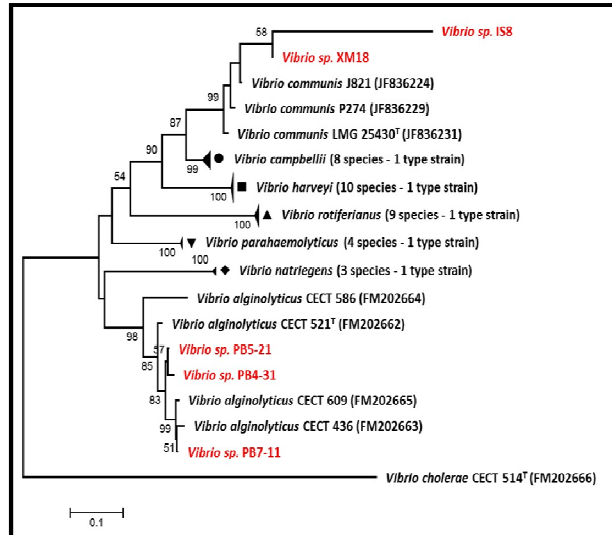
and the DNA-DNA hybridization analysis. Horizontal gene transfer, recombination & gene heterogeneity prevents accurate identification of organisms within the *Vibrio*



group.

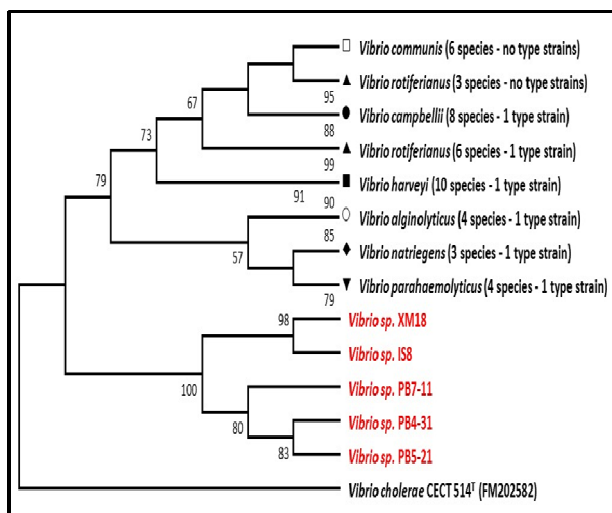
In this study, we utilized the multi-loci sequence analysis (MLSA) to identify *Vibrio*-like isolates from marine biofilm and sponge samples taken from the Caribbean Sea just off Grenada, to study gene evolution.

Five *Vibrio*-like isolates and reference cultures (*V. parahaemolyticus* ATCC 17802<sup>T</sup>, *Vibrio campbellii* CCUG 4979<sup>T</sup>, *V. alginolyticus* CCUG 4223) were grown on TCBS broth for 16 hrs at 37°C. DNA was extracted using a GenElute™ Genomic extraction kit (Sigma-Aldrich Cat. NA2110) following the manufacturer's protocol for Gram negative bacteria. Seven genes for MLSA analysis were amplified using PCR thermocycler MX3005P settings and primer sets as described by Pascual et al. (2009). Gel purified amplicons were sequenced by MWG OPERON (USA) using forward and reverse primers twice. Consensus sequences were produced using highest quality (>40%) aligned forward and reverse chromatograph



Maximum Likelihood phylogenetic tree (1000 bootstrap) constructed using: Concatenation of the genes *rctB*, *rpoD* & *toxR* (1126 bp) for all *Vibrio* isolates.

data. Initial taxonomic classification was carried out using the Basic Local Alignment Search Tool (BLAST) Megablast along with Non-redundant nucleotide database. Multiple Sequence Comparison by Log-Expectation (MUSCLE) was used to produce sequence alignments for each gene and its reference strains from Pascual et al. (2009). Ungapped concatenated sequence alignments were



Maximum Likelihood phylogenetic tree (1000 bootstrap) constructed using: Gene *pyrH* (310 bp) for *Vibrio* isolates from Grenada.

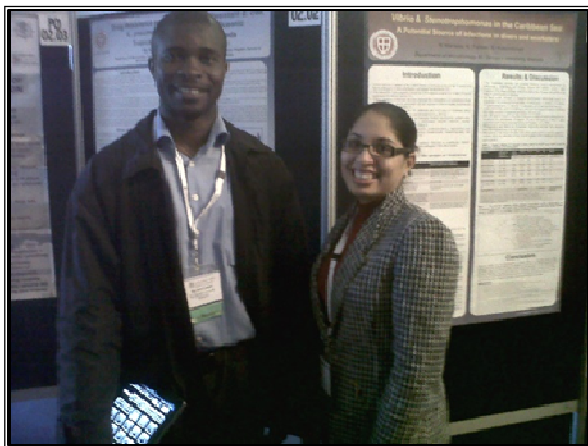
produced using BioEdit v17.09. Mega 5 was used to produce phylogenetic trees based on Maximum Likelihood (ML), Maximum Parsimony (MP), and Neighbour-Joining (NJ) methods. Jmodeltest v2.1 & MEGA 5 using

SiScan, 3Seq.

All the studied genes presented different rates of evolution. The phylogenetic analysis using *toxR*, *rpoD*, *rctB*, *gyrB*, *rpoD*, *recA* and the 16S rDNA demonstrated evolutionary divergence of IS8, XM18, PB7-11, PB5-21 and PB 4-31 within marine *Vibrio*. The *pyrH* & *recA* (21) genes may have undergone an independent evolution and horizontal gene transfer in our Caribbean *Vibrio* isolates.

The tree topology indicated that PB7-11, PB4-31 and PB5-21 isolated from marine biofilms have undergone independent evolution as a single species while sharing a common ancestor with *V. alginolyticus*, which agrees with earlier phenotypic studies of marine *Vibrio*. Strains XM18 and IS8 might belong to a new species of *Vibrio* possibly related to *Vibrio communis*. ML, MP and NJ analyses using the 16rDNA, *toxR*, *rpoD*, *rctB* genes produced similar evolutionary topologies. The effective use of those genes as taxonomic markers correlated well with previous reports, while *purH* and *recA* could be shared via horizontal gene transfer.

Submitted by Svetlana Kotelnikova,  
Ravindra Naraine, & Karla Farmer  
Dept. Microbiology, SGU

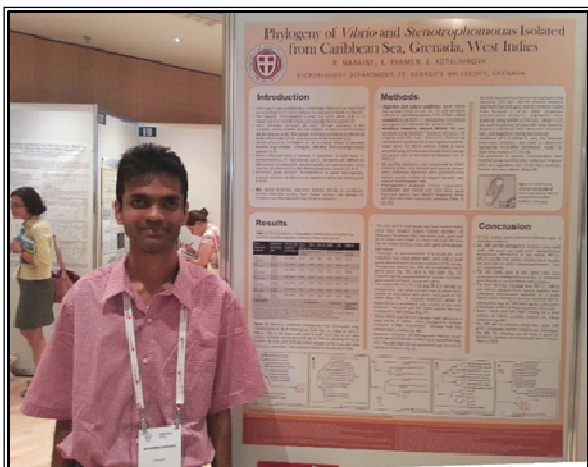


Ms. Karla Farmer (MSc. in Microbiology Candidate—right) presenting poster on *Vibrio* research at the ISTM 13th Conference 2013

the Bayesian Information Criterion, was used to determine appropriate nucleotide substitution model for multi-locus analysis. The presence of genetic recombination was detected using Recombination Detection Program (RDP) v4.0, algorithms RDP, GENECONV, BootScan, MaxChi, Chimaera,

### 5.15 The Environmental Testing Unit (ETU) at St. George's University Controls Quality of Drinking and Bathing Waters

It is of optimum importance that safe and reliable drinking water is made available for human consumption. This importance has been recognized since at least the Roman era, and has been continued by many different organizations throughout the world. Since it is impossible to tell if water is absolutely clean by its appearance, the Environmental Testing Unit (ETU) examines the bacteriological and chemical quality of the drinking water on the St. George's University



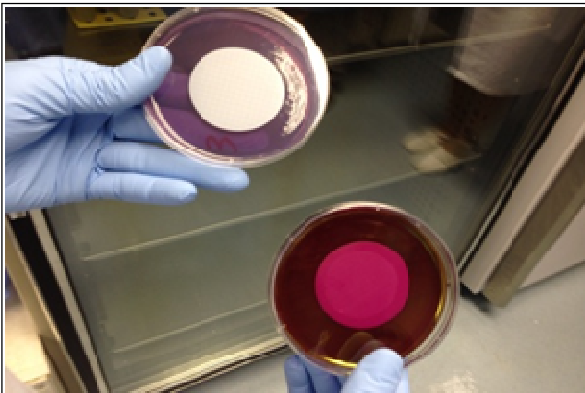
SGU Faculty, Mr. Ravindra Naraine presenting poster on *Vibrio* research at the FEMS 2013 Conference



Ms. Makeda Matthew, BS in Biology, supervised by the ETU Director, Dr. Kotelnikova

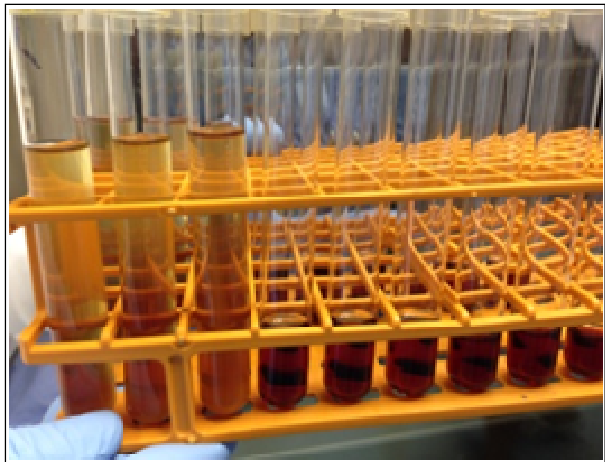
(SGU) campuses.

The ETU was officially established in August 2003 at the Department of Microbiology, School of Medicine, SGU. As the University has grown, there has been a recognized need for continuous sampling and testing, which was piloted in 2013. Each of the sample sites are tested based on priority: Major distribution tanks are tested once every week, while reserve tanks are tested twice to three times per month, or as needed. Chlorine levels in all of the tanks and consumption sites are tested each week to ensure that they meet acceptable standards. Testing for faecal Coliforms, Coliforms, Enterococci and Streptococci is also carried out. The Coliform group, especially *Escherichia coli*, is typically used as fecal pollution indicators in water when assessing



ETU performing drinking water quality assays

the effectiveness of water treatment and disinfection along with monitoring the quality of the water that is been assessed. During 2013 a total of 41 sites were sampled. Drinking water is analyzed using the Membrane Filtration Technique using 0.45 micron membranes which are then aseptically inoculated on selective and differential media filled Petri dishes which are then incubated at a set temperature of 37.5 and 44.5 degrees respectfully for a period of 24 to 48 hours. The coastal water is analyzed using the Most Probable Number Technique. Samples are aseptically inoculated into tubes containing



ETU performing marine water bacteriological safety analysis and reporting

the specific broth and are placed in the incubator for 48 hours. The results of the ETU tests are provided to the SGU business and academic administration, the maintenance department and the SGU Health Services via weekly water report. As of this year, Biology and Medical student groups visited the ETU to learn about the water testing process.

The work of the ETU would not be possible without the hard work and dedication of our team in the Microbiology Department: Makeda Matthew, Beulah Patterson, Grace Dolphin, Suzanne Hall and Reba Davids.

*Submitted by Svetlana Kotelnikova & Makeda Matthew,*



Dept. Microbiology, SGU in the genomic study of the extremophilic

## 5.16 Undergraduate Research in Genomics Presented Internationally

As of January 2014, The [Integrated Microbial Genome Project](#) (IMG) contains approximately 6700 microbial genome

Archaeon *Ferroplasma acidarmanus* Fer1, by modeling functions for hypothetical genes using the ACT platform. *F. acidarmanus* represents a mesophilic Euryarchaeota that thrives at pH levels between 1 and 2.5. In addition to the ACT, we extended the [list of bioinformatic tools](#) and created our own WIKI-based toolbox using the [PB Works SGU Genetics site](#).

IMG Module	Software Tools	Function (Significant e-value $\leq 1e-3$ )
Module 1,2	BLAST; CDD T-COFFEE; WebLogo	Infers homology through sequence similarity between the query gene and a database/library of sequences.
Module 3	TMHMM; SignalP PSORT-B; Phobius; SOSUI	Determines the Cellular localization of the gene product.
Module 4	IMG act-sequence viewer for alternate ORF	Determines suitability of computer derived ORF or discovers better alternative ORFs.
Module 5	TIGRFAM; Pfam PDB; InterProScan; Gen3D	Identifies sequences that share similar conservation in residues that confer a particular structural integrity.
Module 6	KEGG; MetaCyc; Prosite	KEGG seeks to define enzymatic pathway. MetaCyc seeks to find the metabolic pathway.
Module 7	Phylogeny.fr; Gene Context; GC Heat Map	Find any evidence to support horizontal gene transfer.

Summary of bioinformatics tools used to derive functions of the gene

sequences. However only about 60% of protein coding genes in any of the microbial genomes have been assigned a function or been annotated. SGU joined the IMG Annotation project in 2010. The project facilitates training of undergraduate biology and premedical candidates in the use of the Annotation Collaboration Toolkit (ACT), developed by the Human Genome Consortium Institutes. SGU students have been involved



Spring 2013 SGU Undergraduate IMG-ACT participants.

Since Fall 2010, the IMG-ACT project at SGU has enabled 180 undergraduates to experience bioinformatic research using 165 hypothetical protein genes. During the year of 2013, sixty-two undergraduate students participated in the project. The hard work of the students and faculty resulted in the



Fall 2013 SGU Faculty & Undergraduate IMG-ACT participants.

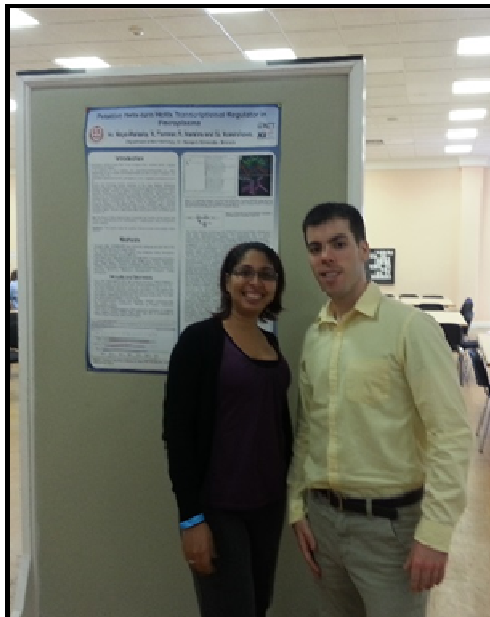
successful annotation of over 100 genes within the *Ferroplasma* genome. The undergraduate SAS student participants worked in small groups under the supervision of Dr. Kotelnikova, Mr. Naraine and a teaching assistant. At least one member of the group of five usually discovers a new function for the assigned DNA sequence.

The whole group is given an opportunity to report their results via online report at [PB Works SGU Genetics](#). This forum provides the students the opportunity to present their discoveries while practicing their scientific writing and presentation skills. They



From Left - Dr. Kotelnikova, Kristin Sellar (Pre-vet), Abi James (Pre-med), Karla Farmer (MSc. in Microbiology Candidate) & Mr. Naraine (SGU faculty) during the SGU Research Day 2013.

work using hypothesis-based and evidence-based research while following statistically approved criteria. The students who discover new functions for their protein-coding genes are invited to submit an abstract for [SGU Research Day](#), via oral or poster presentation. Six undergraduates presented at the SGU



Karla Farmer (Msc candidate) & Henry Mayo-Malasky (Pre-med) with their poster "Putative Helix-turn Helix Transcriptional Regulator in *Ferroplasma*," during the SGU Research Day 2013.

Research Day 2013. One of the topics presented was "[Ferroplasma: A New Complex AAA+ ATPase with Nuclease Function](#)" – by [A. James, K. Arthur, C. Paulsingh, R. Naraine and S. Kotelnikova](#), which revealed a unique ability of the Archaeon genetic sequence to encode multiple functions while using a limited number of nucleotide combinations. The other poster dealt with a different protein: "[Putative Helix-turn Helix Transcriptional Regulator in \*Ferroplasma\*](#)" by [H. Mayo-Malasky, K. Farmer, R. Naraine and S. Kotelnikova](#). There were more detailed oral presentations as well: "[Arabinose Efflux Permease in \*Ferroplasma acidarmanus\* Fer1](#)" by [K. Farmer, R. Naraine & S. Kotelnikova](#) and "[Thermopsin Protein](#)



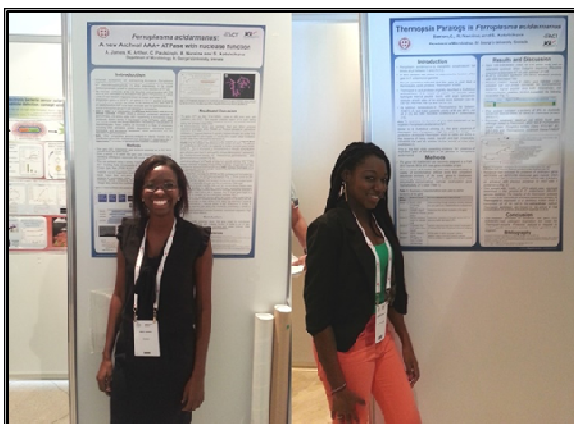
Research Day 2013 Award Recipients with members of the Microbiology Department (front left): Mr. Ravindra Naraine (Best Faculty oral presentation in SOM), Mr. Victor Amadi (Best Faculty Poster Presentation), Ms. Kristin Sellar (Best Student oral presentation in SOM)

[found in \*Ferroplasma acidarmanus\*](#)" by [C. Barton, R. Naraine and S. Kotelnikova](#). The oral presentation by Kristin Sellar for her talk "[Ferroplasma acidarmanus: A New Sulfite Transporter Protein Identified](#)" by [K. Sellar, R. Naraine and S. Kotelnikova](#) won the award for the Best Student Presentation in The School of Medicine for SGU Research Day 2013.

After realizing the quality of presentations, Dr. Kotelnikova decided to apply for SGU funding to enable the best IMG-ACT undergraduate students to present their research results internationally at [the Federation of European Microbiology Society](#)



Group of SGU undergraduates & Faculty who participated in the FEMS Congress in Leipzig, July 2013. From left: Dr. Kotelnikova (RU, Sweden), Kristin Sellar (USA), Celeste Barton, (Trinidad), Abi James (Trinidad), Ravindra Naraine (Grenada), Victor Amadi (Nigeria).



From Left – SGU Pre-med students, Abi James & Celeste Barton, presenting posters on new functions discovered for hypothetical *Ferroplasma* Genes, at the FEMS 2013

[meeting in Leipzig in July 2013](#). The student presentations were well attended and received. This field is currently underrepresented but remains an intriguing and pertinent field for the elucidation of gene function, microbial activity and Bioinformatics.

The SGU presenters have been invited to the [International Congress on Extremophiles](#) in St Petersburg, Russia in September 2014.

*Submitted by Svetlana Kotelnikova,  
Dept. Microbiology, SGU*

### 5.17 Investigation of disease in pre-growout fish in a commercial aquaculture operation in Ecuador, and other marine related projects

Our research into an ongoing outbreak of “syncytial hepatitis” in tilapia in Ecuador is continuing, with Dr Richard Kabuusu leading the investigation as part of his PhD programme. All of the available information points towards this being a viral disease, and with the help of a collaborative arrangement with Dr Ian Lipkin’s viral discovery group at Columbia University, New York, we have now identified 4 viruses associated with affected fish. Work continues to try and determine the importance of these viruses, as well as attempting disease transmission using cell-free extracts.



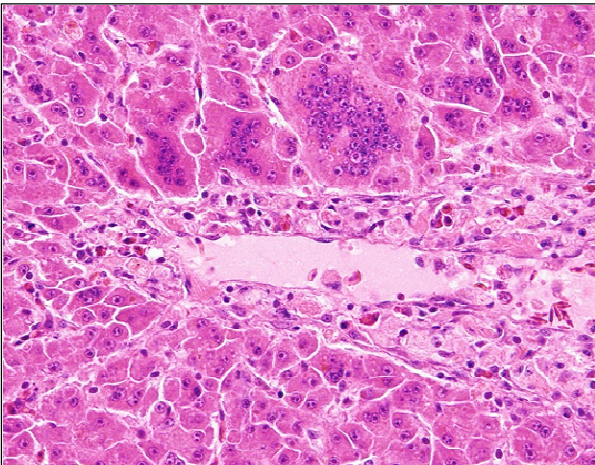
An aerial view of tilapia ponds in this 1500 hectare fish farm in Ecuador

Other ongoing research projects include:

- 1) A study into “Morphological comparisons of

coral polyps within a damaged coral colony.” This study formed the basis for a stand-alone MSc by Danielle Medellin, jointly supervised by Dr. Ferguson and Dr. T. Eurell. Danielle just graduated (summer 2013) and the results are being written up for publication.

2) “Inventory and assessment of health risk of microbes in British Columbia’s Pacific salmon.” 2013-16. I am the pathologist and part of the team on this large project based out of the Department of Fisheries and Oceans research laboratory in Nanaimo, British Columbia, Canada. Work is just getting underway on this project, with the first material arriving imminently. Other collaborators on this project include researchers at the University of California, University of Prince Edward Island, Canada, and the Department of Fisheries and Wildlife, USA.



Liver from affected tilapia showing syncytial giant cells (arrows) adjacent to sinusoid

3) “*Streptococcus phocae* infections in marine mammals: a regional and cross-species perspective.” This project forms the basis for a joint DVM/MSc degree in marine medicine within the pathobiology academic programme, School of Veterinary Medicine, SGU. Nicole Taurisano is the student. Jointly supervised by Dr. H. Ferguson and Dr. D. Stone. Collaborators include Dr Marty Haulena, the lead veterinarian at the Vancouver Aquarium in Canada, and Dr Stephen Rafferty, a

veterinary pathologist based at Abbotsford, British Columbia, Canada.

4) “Investigations into diseases of various species of grouper and eels in Libya”. This research project is funded by the Libyan Government. The Principal Investigator is Dr. Jamila Rizgalla, who is registered for a PhD in Stirling University, Scotland, where Dr Ferguson is *professor emeritus*.

*Submitted by Hugh Ferguson,  
School of Veterinary Medicine, SGU*

### 5.18 East Caribbean Bee Research and Extension Center (ECBREC)

WINDREF continues to collaborate with faculty from the School of Veterinary Medicine on the East Caribbean Bee Research and Extension Centre (ECBREC) at St. George’s University (SGU). The mission of the ECBREC is to improve the health and productivity of bees in Grenada and the Caribbean region by focusing research on livestock sustainability, native bees, honeybee husbandry, ecology, behavior, and conservation. The results of the ECBREC research programs are and will continue to be communicated to the public and private sector groups via targeted and multi-faceted extension efforts, thereby enhancing the sustainability of agriculture, beekeeping and native pollinators. The ECBREC provides scientific knowledge and expertise to the wider Caribbean community and is dedicated to developing knowledge in agriculture research and extension services as well as in human and natural resources. Finally, students and those in the agriculture sector can receive mentoring, training, and instruction in many areas related to honey bee and native pollinator research, thus ensuring a future generation of educators, researchers, conservationists and more. This is critical to the sustainability of the program and bee research in the wider Caribbean.

There are a number of bee research

centers around the globe, including OIE Reference Labs in France and Germany, one associated with the USDA in the United States, one in South Korea, two major centers in Canada (University of Guelph and the University of Alberta), and one in Argentina. As such, Grenada presents as an ideal location for a bee research centre given its strategic geographic location and those areas needed for the development of Bee research, the importance of sustainable agriculture in the East Caribbean, and the importance of cultivating environmental stability through the study and evaluation of bees and apiculture within the Africa, Caribbean and Pacific (ACP) regions. Currently, no apiculture centers exists in the tropics. Further, few existing centers prioritize academic development, but instead focus on interpretation of research and evaluation of diagnostic materials. The vision for the ECRBEC is unique in that not only will it be located in a region that provides a virgin tropical environment, but it will also endeavor to develop academic programs. As such, the ECRBEC will serve as a regional center for the study of entomology with a specific focus on agriculture/apiculture. It will provide a forum for scholarly directed and self-directed study, and provide opportunities for researchers and educators to collaborate (network) share and develop best practice in apiculture.

*Submitted by Tom Aire  
School of Veterinary Medicine, SGU*

## Section 6.0

### 2013 Research Grants

We would like to thank all of the donors who have made WINDREF's work possible in 2013:

- The Bartholomew J. Lawson Foundation for Children, in partnership with Reach Grenada
- Dr. Mary-Jeanne Kreek, Kreek Laboratory, Rockefeller University
- International Development Research Centre (IDRC)
- Wellcome Trust
- The United Nations Framework Convention on Climate Change (UNFCCC) Secretariat – Clean Development Mechanism Programme
- General Secretariat of the Organization of American States – Executive Secretariat of the Inter-American Drug Abuse Control Commission (ES/CICAD) – Secretariat for Multidimensional Security
- Department of Foreign Affairs and International Trade via the High Commission of Canada – Barbados – Canada Fund for Local Initiatives
- Inter-American Institute for Cooperation on Agriculture - US Department of Agriculture
- Produmar, S.A.
- Bruce Ratner Family Fund
- Private donation by Ellen Ratner
- St. George's University, for ongoing support, including the Small Research Grant Initiative which has helped some WINDREF scientists

#### 6.1 Ongoing externally funded projects

There were eleven ongoing funded projects in 2013 with a total multi-year value of \$599,338 USD:

- Akpinar-Elci, M. (2013). Revitalizing the Nutmeg Industry in Grenada. Department of Foreign Affairs and

- International Trade via the High Commission of Canada, Barbados. \$20,300.
- Bonaparte, B. (2013-2015). Drug Demand Reduction: A Caribbean University Interdisciplinary and Integrated Proposal. Executive Secretariat of the Inter-American Drug Abuse Control Commission (ES/CICAD). \$40,000.
  - Cox-Macpherson, C., & Akpınar-Elci, M. (2013). The Bioethics of Health and Climate Change in the Caribbean. Wellcome Trust. \$8,000.
  - Ferguson, H. (2011-2014). Investigation of Disease in Pre-growout Fish in a Commercial Aquaculture Operation in Ecuador. Produmar, S. A. \$61,995.
  - Landon, B. (Ongoing). Reach Institute for Children at SGU. Reach Grenada. \$31,491.
  - Macpherson, C. (2011- ). Sport for Health. House of Lords Fundraiser and Ratner Family Fund. \$55,000.
  - Macpherson, C. (2013- ). Outreach Activities in South Sudan. Private Donation by Ellen Ratner. \$24,000.
  - Noël, T. P. (2009-2014). Neglected Tropical Diseases (NTDs) and Rheumatic Fever in Grenada: a project to prevent/eliminate helminthic and rheumatic fever infections among children (5-15 years of age). Bartholomew J. Lawson Foundation for Children. \$41,903.
  - Noël, T. P. Genetic Correlates of the Addictive Diseases: Cocaine, Alcohol and Marijuana Addiction - Grenada, W.I., Dr. Mary-Jeanne Kreek, Kreek Laboratory, Rockefeller University. \$35,000.
  - Radix, R. (2012-2015). Grenada Schools Nutrition Study. International Development Research Centre. \$304,000.
  - Sealy, H. (2013- ). UNFCCC Clean Development Mechanism (CDM) Caribbean Regional Collaborating Centre (RCC) at St. George's University. UNFCCC Secretariat Clean Development Mechanisms Programme. \$34,644.
  - Waechter, R., Johnson, D., Landon, B., Mandalaneni, K., & Rabie, S. (2013-2014). Promoting Resilience Among Medical Students: A Comparison of Mindfulness, Yoga, and Exercise. SGU Small Research Grants. \$5,000.

## 6.2 Year 2013 Grant submissions

Ten grant applications were submitted to external funding agencies in 2013, with a total potential value of \$3,432,719 USD. So far, two of those applications were successful, three were turned down, and five are outstanding (listed by Principal Investigator):

- Bidaisee, S. (2013). Mitigating Childhood Asthma through Community Based Swimming Programs. Grand Challenges Canada. \$100,000.
- Bidaisee, S. (2013). Leveraging Existing Health Infrastructure to Address Trypanosomiasis. Gates Foundation Grand Challenges in Global Health. \$100,000.
- Burbank, K. (2013). One Health Organizations (OHO:) Organizational Models and Performance. Grand Challenges Explorations. \$100,000.
- Cox-Macpherson, C., & Akpınar-Elci, M. (2013). The Bioethics of Health and Climate Change in the Caribbean. Wellcome Trust. \$8,000.
- Cummings, T. (2013). Development and Implementation of a Comprehensive Database and Mobile App to Boost Female Smallholder Farmers' Crop Yields. Grand Challenges Canada. \$100,000.
- Forde, M. (2013). Leptospirosis in the Caribbean: Seroprevalence, Identification and Circulating Serovars, and Molecular Characterization of Isolates. NIH

- National Institute of Allergies and Infectious Diseases. \$831,948.
- Keku, E. (2013). Chronic Diseases in the Caribbean: Building Regional Capacity to Address a Growing Epidemic. NIH Fogarty International Centre Research Training Planning Award (NCD LIFESPAN D71). \$58,277.
  - Macpherson, C. (2013). Data Collaborating Centre in Grenada - United States Agency for International Development. \$2,000,000.
  - Macpherson, C. (2013). Pastoralist Public Health Practice: Methods for Controlling Trypanosomiasis and Leishmaniasis. Grand Challenges Explorations. \$99,950.
  - Sealy, H. (2013). UNFCCC Clean Development Mechanism (CDM) Caribbean Regional Collaborating Centre (RCC) at St. George's University. UNFCCC Secretariat Clean Development Mechanisms Programme. \$34,644.

## Section 7

### Past, Present, and Future Research Projects

#### 7.1 Non-communicable Diseases

- Angiotensin converting enzyme and angiotensinogen gene polymorphisms in the Grenadian population: relation to hypertension
- Development of a decision rule for screening Obstructive Sleep Apnea and its epidemiologic relevance to the people of Grenada
- Prevalence and associated risk factors of hypertension in a sample population of native Caribbean's in Grenada, West Indies
- Assessing the prevalence of diabetic complications by examining type I and type II adult diabetics for signs of retinopathy, neuropathy, nephropathy and dermatological changes associated with poor glucose control within the native Caribbean population of Grenada
- Hypertension management and control in two Caribbean countries
- Assessment of the effectiveness of broad-spectrum treatment to children with protozoan and nemathelminthic parasitic infections on diarrhea and school attendance
- The effects of iron-deficiency anemia on cognition and behavior in infants
- Diurnal variation of urinary endothelin-I and blood pressure: related hypertension
- Alcohol consumption in Grenada
- The incidence and mortality of cancer in Grenada over the ten year period: 1990-1999

- The prevalence of abnormal haemoglobin traits in Grenadian secondary school adolescents
- Knowledge, attitudes, beliefs and practices of sickle cell anemia in Grenadian primary and secondary school children
- Decompression sickness among the indigenous fishing population in Grenada: Assessing the burden of disease
- WINDREF / SGU Hurricane Relief
- Spice Research Program
- Sulfate-reducing bacteria in oxidized freshwater of tropical mangroves
- Novel antibiotics from tropical marine environments: drug development in Grenada
- Study of the mutacin C-7A
- Gram-negative bacteria isolated from aquatic environments of Grenada (61.4° W, 12.0°N), West Indies
- Identification of bacteria producing antibiotics isolated from deep marine biofilms of Grenada
- SGU Environmental Testing Unit (ETU)
- Post-hurricane water surveillance in problematic areas of Grenada
- Evaluation of the relocation potential for villagers residing in Queen Elizabeth National Park, Uganda
- Study of the calls of the spotted hyena at feeding
- Survey on the attitude of villagers in Queen Elizabeth National Park, Uganda towards the threat of lions, leopards and hyenas
- Epidemiology of human injuries resulting from wildlife in ten villages within Queen Elizabeth National Park, Uganda
- Rural Ugandan village perspective on lion, leopard and hyena conservation
- Epidemiology of human injuries by wildlife in six villages within Queen Elizabeth National Park, Uganda
- Prevalence of *Campylobacter fetus* subspecies *venerealis* and other microorganisms in the reproductive tracts of cattle from the southern region of Santo Domingo, Dominican Republic
- Antimicrobial properties of skin secretions from *Eleutherodactylus johnstonei* on bacteriological isolates
- Examination and analysis of prostate cancer in Grenada
- A Church-based intervention to improve hypertension prevention and control among women in Grenada
- Occupational Health Problems among Nutmeg Factories Workers, SGU Small Research Grant Initiative
- Sport for Health Programme
- Grenada School Nutrition Study: Evidence to Inform Policy
- Genetic Correlates of the Addictive Diseases: Cocaine, Alcohol and Marijuana Addiction - Grenada
- Promoting Resilience Among Medical Students: A Comparison of Mindfulness, Yoga, and Exercise

## 7.2 Infectious Diseases

- Investigation of the prevalence of SIV in the mona monkey (*Cercopithecus mona*) in Grenada
- Seroprevalence of HIV-I and HIV-II in pregnant women in Grenada, W.I. – their knowledge of AIDS and their exposure



- hazards to the virus
- A cross sectional study of the current status of *Schistosoma mansoni* in St. Lucia by field surveys and supplementary data collection
  - Identification and characterization of hantaviruses among the mammal population of Grenada
  - HIV/AIDS health education and evaluation program in Grenada
  - The seroprevalence of *Toxoplasma gondii* in a population of pregnant women and cats in Grenada, West Indies
  - The efficiency of diagnosing women of *Toxoplasma gondii* using PCR techniques in comparison with ELISA
  - Dengue virus in Grenada: seroprevalence and associated risk factors
  - A current appraisal of dengue virus in Grenada – serotype analysis and vector assessment
  - A site receptivity study determining the threat of reintroduction of malaria into Grenada through the study of Anopheline spp. mosquito vectors
  - Chlamydial infection among STD clinic attenders in Grenada
  - Fever in Grenada
  - Mosquitoes and tourism in Grenada
  - Effectiveness of a formula feeding/weaning intervention program in preventing transmission of HTLV-1 from seropositive mothers to newborns in Grenada
  - A multi-center longitudinal research study of the behavioral significance of the prevalence of HIV-1 infection in pregnant women and their babies on the islands of Grenada and St. Vincent
  - A multi-center longitudinal research study of the ethical analysis of informed consent of the prevalence of HIV-1 infection in pregnant women and their babies on the islands of Grenada and St. Vincent
  - Determining the role of IL-15 in mediating function of viral-specific CD8+ T cells in the myelopathogenesis of HTLV-1: symptomatic versus asymptomatic patients
  - Intestinal protozoan infections in 6-12 year old children in Grenada
  - Intestinal helminth infections in 6-12 year old children in Grenada
  - The prevalence of intestinal parasites in school children in rural Guyana
  - The prevalence of filariasis and its effects on children aged 8-14 in the central corentyne region of rural Guyana
  - The prevalence of streptococcal infection in school children aged 5 – 15 years in Grenada, Carriacou and Petit Martinique
  - Studies examining the elimination of lymphatic filariasis as a public health problem in Guyana
  - Seroprevalence of heartworm infection in dogs in Grenada
  - Dengue in Grenada
  - Assessing the potential risk factors of dengue and dengue hemorrhagic fever in the tri-island state of Grenada, Carriacou and Petit Martinique
  - A comparative study to find out if there is an association between sexual practices and knowledge in adult populations of Botswana and Grenada with the prevalence of HIV/AIDS
  - HIV/AIDS in rural Botswana differentiating between informing and educating

- Evaluating the level of perceived fear and desensitization towards HIV/AIDS in Botswana
- Rheumatic Fever in Grenada
- Streptococcal program in St. Vincent
- Isolating T cells from Rheumatic Fever positive blood: immunofluorescent assay of T lymphocytes via fluorescently labeled monoclonal antibodies
- Possible genetic predisposition to Rheumatic Fever: demonstrating the inheritance fashion of non-HLA B lymphocyte alloantigen D8/17, a marker for Rheumatic Fever
- ELISA antibody titres against group A streptococcal M protein moiety and cell wall N-Acetyl-D-Glucosamine in Grenadian Rheumatic Fever patients
- Evaluating the effectiveness of educational methods in the prevention of Rheumatic Fever and knowledge, awareness and practices
- Prevalence of intestinal helminth infections in rural Grenadian school children
- Cystic echinococcosis in Morocco and Uganda
- Elimination of Lymphatic Filariasis in Guyana Program
- Neglected Tropical Diseases and Rheumatic Fever in Grenada: A project to prevent/eliminate helminthic and rheumatic fever infections among children (5-15 years of age)
- isolation and antimicrobial assay of potential antibiotics derived from their skin
- Mona monkey studies in West Africa
- Investigation of medicinal plants in Grenada
- Use of medicinal plants in Grenada
- Medicinal drugs from the sea: what do Grenada's waters have to offer?
- Beekeeping in Grenada: effects of the mite *Varroa jacobsoni* and its control
- Effects of Grenadian medicinal plants on endemic microbial causes of diarrhoeal diseases
- The neurobiological basis of hypoglycemia-associated autonomic failure
- Stimulation of angiotensin 4 in cardiac fibroblasts activates matrix metalloproteinases through MAP kinases pathways: A model for astrocytes
- REM sleep and memory
- End of life care in Grenada
- Novel antibiotics from tropical marine environments
- Genetic correlates of the addictive diseases: cocaine, alcohol, and marijuana addiction– Grenada
- An investigation of pediatric botanical medicine for acute respiratory infections
- Efficacy of phage therapy using an in vitro biofilm wound model system
- Degradation of 7 keto cholesterol by Xenohydrolases
- Ecological survival properties of pelagic and benthic indicator microorganisms from the St. John's river outflow in Grenada

### 7.3 Unique Projects

- Characterization of five amphibians inhabiting Grenada and subsequent

- The public health importance of dogs, Grand Anse, Grenada
- Greater occipital nerve zones for treatment of occipital neuralgia
- Photovoltaic power generation program
- Review of current biomedical waste management practices in the Organization of Eastern Caribbean States (OECS) Countries
- Microbial diversity in the iron-oxidizing biofilms of soda springs in Grenada
- Circadian cycle of iron-oxidation in warm soda springs in St. Andrew's, Grenada, West Indies
- Do the microorganisms in the soda spring water derive energy from the oxidation of manganese?
- Novel marine bacteria and their antagonistic properties against medically relevant biofilms
- Physiological characterization of novel marine bacterial species isolated off Grenada
- Characterization of marine sponge-associated bacteria and cytotoxic activity of sponge extracts towards human cancer cells
- Examining HIV/AIDS provider stigma: assessing regional concerns in the islands of the Eastern Caribbean
- Knowledge, attitudes and practice survey for women (baseline survey)
- Caribbean EcoHealth Programme: public and environmental health interactions in food and water-borne illnesses (CEHP)
- Persistent Organic Pollutants
- Implementing Renewable Energy and Preventing Land Degradation: An Intervention in the Nutmeg Industry in Grenada
- Effects of prenatal ethanol exposure on the role of matrix-metalloproteinase mediated neural crest cells in an avian model
- Assessing Medical Students' Behavior, Perception, and Knowledge of UV Exposure and Sunscreen Application in the Caribbean (Grenada)
- Basic Life Support Knowledge and Skill Retention in Pre-Clinical Undergraduate Medical Students
- Student Satisfaction, Comfort and Self-confidence in a Simulation Lab Practice Session
- Reducing marine Litter in the Wider Caribbean: Developing and Implementing Best Waste Management Practices
- Ethical Issues and Challenges in Global Population Health Research Partnerships
- Disaster Management in Grenada: Northumbria University Student Research
- Baseline Coral Reef Monitoring Program for Sandy Island Oyster Bed Marine Protected Area Mooring Buoy Installation Project
- Genome annotation in microorganisms and metagenomic libraries as a part of an undergraduate curriculum
- Molecular identification of marine *Vibrio* isolated in Grenada
- Occurrence of Antibiotic-resistant Fecal Indicators in Coastal waters of Southern Grenada
- Investigation of disease in pre-growout fish in a commercial aquaculture operation in Ecuador
- Revitalizing the Nutmeg Industry in

Grenada.

- Drug Demand Reduction: A Caribbean University Interdisciplinary and Integrated Proposal.
- The Bioethics of Health and Climate Change in the Caribbean
- Reach Institute for Children at SGU
- Outreach Activities in South Sudan
- UNFCCC Clean Development Mechanism (CDM) Caribbean Regional Collaborating Centre (RCC) at St. George's University.

## Section 8.0

### International Conferences Sponsored in Grenada (1)

- USDA Regional Mite Identification workshop, executed by the USDA-APHIS, Inter-American Institute for Cooperation on Agriculture (IICA) CARICOM Secretariat with technical expertise provided by the Florida Association for Volunteer Action in the Caribbean and the Americas (FAVACA), October 2013.

## Section 9.0 Presentations

### 9.1 Presentations at International Conferences/Invited Plenary/ Workshops/Roundtables(26)

- Anderson, R., Morrall, C., Jossart, J., Nimrod, S., Bolda, E., Musser, K., Berg, C., Balza, R. (2013). Marine Protected Area monitoring before and after implementation of management practices in the nearshore waters of Grenada, Eastern Caribbean. Presented by Bola and Musser at: The 36<sup>th</sup> Association of Marine Laboratories of the Caribbean Scientific Meeting, Jamaica.
- Bidaisee, S., Macpherson, C.C., Macpherson, C.N.L. (2013). Downturn in West Indian Cricket: A Consequence of Climate Change. Presented at the Bioethics Society of the English Speaking Caribbean (BSEC), Annual Meeting, St. George's, Grenada.
- Bidaisee, S., Nakagawa, J., Prince, D., Macpherson, C.N.L. (2013). Touch Toe Test: Community Based Diabetes Prevention Initiative. Presented at the 141<sup>st</sup> American Public Health Association Annual Meeting, Boston, USA.
- Bidaisee, S., Radix, R., Beckord, B., Macpherson, C.N.L. (2013). Sexual and Reproductive Health Education: A Case for Primary School Curriculum. Presented at the Caribbean Studies Association 38th Annual Conference, Grenada.
- Bidaisee, S., Radix, R., Giganti, M., Akpinar-Elci, M., Elci, O.C. (2013). Review of Motor Vehicle Accidents in Grenada from 2000 to 2012. Presented at the Caribbean Studies Association 38th Annual Conference, Grenada.
- Dookeeram, D., Sammy, I., Dookeeram, D., Bidaisee, S., Maharaj, S. (2013). Opportunities for Quality Program Improvement in Emergency Departments. Paper presented at Improvement in Health Care Quality and Delivery: Making a Difference (UWI St. Augustine); Trinidad and Tobago.
- Ferguson, H. W. (2013). Platform Presentation: "Emerging diseases of fish" at commonwealth Scientific and Industrial Research Organization (CSIRO) at Geelong, Australia.
- Ferguson, H. W. (2013). Platform Presentation: "Emerging diseases of fish and Gill diseases" at the Cairns Conference, Queensland, Australia.
- Forde, M., (2013). Prenatal exposures to bisphenol A (BPA) in 10 Caribbean countries, Presented at the 141<sup>st</sup> American Public Health Association Annual meeting, Boston, USA.
- Forde, M., (2013). What's in your baby? Assessing prenatal exposures and potential health outcomes to persistent organic pollutants (POPs), pesticides, and heavy metals in 10 Caribbean countries. Presented at the 58<sup>th</sup> Annual Caribbean Public Health Agency Scientific Conference, Barbados, West Indian Med J; 62 (Suppl. 2): 32.
- Kabuusu, R.M., Stroup, D.F., Macpherson, C.N.L., Christmon, J., Alexander, R., Richards, C. (2013). Analysis of time trends for canine heartworm in Grenada and its risk factors based on veterinary clinical pathology database records between 2005 and 2009. Presented at the 58<sup>th</sup> American association of Veterinary Parasitologists, Chicago, USA.
- Krecek, R.C., Lee, E., Lucas, H., Drebot, M.A., Wood, H., Loftis, A., Robertson, L., Dimitrova, K., Makowski, K., Dillon, L., Dewailly, E., Morrison, K., Forde, M., Kelly, P., (2013). Zoonotic parasite research in the Caribbean, Presented at the 24th International Conference of the World Association for the Advancement of Veterinary Parasitology, Perth, Australia.

- Macpherson, C.C. (2013). Climate Change: A neglected topic in bioethics. Presented at American Society for Bioethics and Humanities. Atlanta, USA.
- Macpherson, C.C. (2013). Hastings Center Visiting Scholar Presentation: "Bioethics and Climate Change". The Hastings Center, Garrison, NY, USA.
- Macpherson, C.C., and Akpinar-Elci, M. (2013). Bioethics and Health in the Caribbean: Climate Change. Presented at the Bioethics Society of the English Speaking Caribbean (BSEC), Annual Meeting, St. George's, Grenada.
- Macpherson, C.N.L. (2013). Visiting Scholar Lecture: "Dogs, zoonoses and human health". Presented at the Ege University, Izmir, Turkey.
- Macpherson, C.N.L. (2013). Role of ultrasound in the epidemiology of parasitic diseases. Short course on ultrasound and tropical medicine: Approved and recognised by WHO. Pavia University, Pavia, Italy
- Macpherson, C.N.L. (2013). Short course on ultrasound and tropical infectious diseases with a special emphasis on echinococcosis (course convenor). XXV International congress on hydatidology, Khartoum, Sudan.
- Macpherson, C.N.L. (2013). Windward Island Research and Education Foundation/ St. George's University and the Global Virus Network Link. 15<sup>th</sup> Annual Meeting, Moscow, Russia.
- Macpherson, C.N.L. and Little, S. (2013). Invited (plenary) Novartis lecture: "Cestode zoonoses: a one health perspective". World Association for the Advancement of Veterinary Parasitology, Perth, Australia.
- Macpherson, C.N.L., Stone, D., Pinckney, R. and Neil, K. (2013). Invited (plenary) Novartis lecture: "Dogs zoonoses and Tropical Beaches". World Association for the Advancement of Veterinary Parasitology, Perth, Australia.
- McCann, T.J., Horan, T.R., Speake, J.R. (2013). Bringing elements of simulation to the lecture hall in pre-clinical medical education. Invited Workshop at the Society for Simulation in Healthcare 12th Annual International Meeting on Simulation in Healthcare. Orlando, FL, USA.
- Paterson, T.E., Halliwell, R.E., Fields, P.J., Louw, M.L., Ball, G.S., Louw, J.P., Macpherson, C.N.L., Pinckney, R.D., McKibben, J.S. (2013). Canine generalized demodicosis treated with varying doses of Advocate® (moxidectin 2.5% + imidacloprid 10%) (Bayer Animal Health) and oral ivermectin: parasitocidal effects and long-term treatment outcomes. Presented at the 24<sup>th</sup> International Conference of the World Association for the Advancement of Veterinary Parasitology, Perth, Australia.
- Schnurr, R.D., McCann, T.J. (2013). Assessing veterinary student support for simulated animal CPR training in the curriculum. Merial Summer Scholars Program. Abstract and invited poster presentation at Merial/ NIH Research Symposium, Lansing, MI.
- Sellar, K., Naraine, R. and Kotelnikova, S. (2013). *Ferroplasma acidarmanus*: a new sulfite transporter protein identified. Presented at Federation of European Microbiologist Societies 5th Congress, Leipzig Germany.
- Tomsons, S., Gomez, A., Morrison, K.E., Forde, M., (2013). North-South Research and Social Justice: A New Paradigm for Research Ethics. Presented at the Canadian Political Science Association Annual Conference, University of Victoria, Victoria, BC, Canada, June 4-6, 2013.

## 9.2 Poster Presentations (9)

- Amadi, V., Kotelnikova, S.V. (2013). Antibigrams and frequencies of fecal bacterial indicators: *Escherichia coli*, *Klebsiella pneumoniae* and *Enterococcus faecalis* in the oceanic waters of Southern Grenada. Poster Presented at the 5<sup>th</sup> Congress of European Microbiologists, Leipzig, Germany.
- Barton, C., Naraine, R., and Kotelnikova, S. (2013). Thermopsin paralogs found in *Ferroplasma acidarmanus*. Poster presentation at the Federation of European Microbiologist Societies 5th Congress, Leipzig, Germany.
- Bidaisee, S. (2013). A Review of the Global One Health Approach. Posted presented at the One Health Congress, Bangkok, Thailand.
- Dabrowiecki, A.M., Chang, D.R., Tom, W., McCann, T.J. (2013). Practical Skill Retention in Medical Students: Improving Cardiopulmonary Resuscitation with Hands-On Practice. Invited research poster presentation at the Society of Academic Emergency Medicine Annual Conference. Atlanta, GA, USA.
- James, A., Arthur, K., Paulsingh, C., Naraine, R. and Kotelnikova, S. (2013). *Ferroplasma*: A new complex AAA+ ATPase with nuclease function. Poster presentation at the Federation of European Microbiologist Societies 5th Congress, Leipzig, Germany.
- Kotelnikova, S., Amadi, V. (2013). Drug resistance and frequencies of resistant *E. coli* and *E. faecalis* in oceanic tropical waters of Grenada. Poster Presented at the 13<sup>th</sup> Conference of the International Society for travel Medicine, Maastricht, The Netherlands.
- Naraine, R., Famer, K., and Kotelnikova, S. (2013). *Vibrio* and *Stenotrophomonas* in the Caribbean Sea: A Potential Source of Infections in divers and snorkelers. 13th Conference of International Society of Travel Medicine, Maastricht, the Netherlands.
- Naraine, R., Farmer, K., Kotelnikova, S. (2013). Phylogeny of *Vibrio* and *Stenotrophomonas* isolated from Caribbean Sea, Grenada, West Indies. Presented at the Federation of European Microbiologist Societies 5th Congress, Leipzig Germany.
- Speake, J.R., McCann, T.J. (2013). Interactive Simulation Sessions for Veterinary Students Using Digital Videos. Invited Technology and Innovations Poster at the Society for Simulation in Healthcare 13th Annual International Meeting on Simulation in Healthcare. Orlando, FL, USA.

## Section 10.0 Publications

### 10.1 Books (5)

- Abrahams, P.H., Spratt, J.D., Loukas, M., Hutchings, R.T. (2013). McMinn's Clinical Atlas of Human Anatomy 7th edition. Philadelphia: Elsevier.
- Loukas, M., Benninger, B., Tubbs, R.S (2013). Gray's Clinical Photographic Dissector of the Human Body: With STUDENT CONSULT Online Access. Philadelphia: Elsevier Saunders. ISBN 978-1-4377-2417-2.
- Macpherson, C.N.L., Meslin, F-X, and Wandeler, A.(2013). *Dogs, Zoonoses and Public Health*, 2nd Edition. Wallingford, Oxon, UK:CAB International Publishing.
- Shoja, M.M., Agutter, P.S., Tubbs, R.S., Ghanei, M., Ghabili, K., Harris, A., Loukas, M.(2013). *Hypothesis in Clinical Medicine*. Hauppauge, NY: Nova Science Publishers. ISBN-13: 978-1622572762
- Tubbs, R.S., Bosmia, A.N., Richli, M., Loukas, M., Agutter, P.S, Shoja, M.M. (2013). *Hamilton's History of Medicine and Surgery*. Hauppauge, NY: Nova Science Publishers ISBN-13: 978-1629488820

### 10.2 Book Chapters (6)

- Akpinar-Elci, M. and Sealy, H. (2013). Chapter 16: Climate Change and Public Health in Small Island States and Caribbean Countries. In K.E. Pinkerton and W.N. Rom (eds.), *Global Climate Change and Public Health* ( pp 279-292). NY: Springer Science & Business Media DOI 10.1007/978-1-4614-8417-2\_16
- Bidaisee, S., Macpherson, C.C., Macpherson, C.N.L. (2013). Chapter 6: Human behavior and the epidemiology of viral zoonoses. In S.K. Singh (eds), *Viral Infections and Global Change*(pp 97-110). NJ: J Wiley&Sons. doi: 10.1002/9781118297469.ch6
- Forde, M., Morrison, K., Dewailly, E., Badrie, N., Robertson, L., (2013). Enhancing research capacity at the national and community levels within the Caribbean. In J.B. Laewen Capacity (eds), *Development: Perspectives, Opportunities and Challenges* (pp 149-158). Hauppauge, NY: Nova Science Publishers, Inc.
- Loukas, M., Shah, S., Bhusnurmath, S., Bhusnurmath, B.S., and Tubbs, R.S. (2013). Chapter 1: A General Outline of the Cardiac Lymphatic System. In G. Karunamuni (ed.), *The Cardiac Lymphatic System: An Overview* (pp 3-15). New York: Springer Science and Business Media. DOI 10.1007/978-1-4614-6774-8\_1
- Macpherson, C.N.L. and Torgerson, P.R. (2013). *Dogs and Cestode zoonoses*. In Macpherson, C.N.L., Meslin, F-X, A. Wandeler (eds), *Dogs, Zoonoses and Public Health 2<sup>nd</sup> Edn.*(pp 127-152). Guildford: CAB International.
- Tubbs, R.S., Shoja, M.M., Loukas, M., Oakes, W.J. (2013). *Surgical Anatomy of the Cranio-cervical Junction Relevant to Chiari Malformation*. In Tubbs, R. Shane; Oakes, W. Jerry (Eds.), *The Chiari Malformations* (pp73-82). New York: Springer.



**10.3 Journal Articles (58)**

- Adeeb, N., Deep, A., Griessenauer, C.J., Mortazavi, M.M., Watanabe, K., Loukas, M., Tubbs, R.S., Cohen-Gadol, A.A. (2013). The intracranial arachnoid mater : a comprehensive review of its history, anatomy, imaging, and pathology. *Childs Nervous System*, 29(1), 17-33.
- Adeeb, N., Mortazavi, M.M., Deep, A., Griessenauer, C.J., Watanabe, K., Shoja, M.M., Loukas, M., Tubbs, R.S. (2013). The pia mater: a comprehensive review of literature. *Childs Nervous System*, 29(10), 1803-1810.
- Agutter, P.S., Shoja, M.M., Tubbs, R.S., Rashidi, M.R., Khalili, M., Hosseini, S.F., Ghabili, K., Cohen-Gadol, A.A., Loukas, M. (2013). Hysterical paralysis and premature burial: a medieval Persian case, fear and fascination in the West, and modern practice. *Journal of Forensic and Legal Medicine*, 20(3), 133-135.
- Akpinar-Elci, M., White, S.K., Siegel, P.D., Park, J.-H., Visotcky, A., Kreiss, K., Cox-Ganser, J.M. (2013). Markers of upper airway inflammation associated with microbial exposure and symptoms in occupants of a water-damaged building. *American Journal of Industrial Medicine*, 56(5), 522-530.
- Amuleru-Marshall, O. & Amuleru-Marshall, Z. (2013). The perspective of psychologists in Grenada. *The Journal of Black Psychology*, 39(3), 321-323.
- Anderson, R.H., Spicer, D.E., Hlavacek, A.J., Hill, A., Loukas, M. (2013). Describing the cardiac components--attitudinally appropriate nomenclature. *Journal of Cardiovascular Translational Research*, 6(2), 118-123.
- Apaydin, N., Kendir, S., Loukas, M., Tubbs, R.S., Bozkurt, M. (2013). Surgical anatomy of the superior gluteal nerve and landmarks for its localization during minimally invasive approaches to the hip. *Clinical Anatomy*, 26(5), 614-620.
- Bellary, S.S., Steinberg, A., Mirzayan, N., Shirak, M., Tubbs, R.S., Cohen-Gadol, A.A., Loukas, M. (2013). Wormian bones: A review. *Clinical Anatomy*, 26(8), 922-927.
- Bosmia, A., Watanabe, K., Shoja, M.M., Loukas, M., Tubbs, R.S. (2013). Michael Servetus (1511-1553): physician and heretic who described the pulmonary circulation. *International Journal of Cardiology*, 167(2), 318-321.
- Chou, J., Walters, A., Hage, R., Zurada, A., Michalak, M., Tubbs, R.S., Loukas, M. (2013). Thyroglossal duct cysts: anatomy, embryology and treatment. *Surgical and Radiologic Anatomy*, 35(10), 875-881.
- Erolin, C., Shoja, M.M., Loukas, M., Shokouhi, G., Rashidi, M.R., Khalili, M., Tubbs, R.S. (2013). What did Avicenna (Ibn Sina, 980-1037A.D.) look like? *International Journal of Cardiology*, 167(5), 1660-1663.
- Fakoya, F.A. (2013). Integrating ultrasound technology into teaching gross anatomy: point of order! *Medical Education Online*. DOI 2013;18:20888
- Ferguson, H.W., Kabuusu, R., Lince, J.A., Beltran, S., Reyes, E. & del Pozo (2013). Hepatic syncytial disease of farmed tilapia (*Oreochromis niloticus* L): a case report. *Journal of Fish Diseases* (Published Online). DOI: 10.1111/jfd.12142
- Foreman, P., Griessenauer, C.J., Watanabe, K., Conklin, M., Shoja, M.M., Rozzelle, C.J., Loukas, M., Tubbs, R.S. (2013). L5 spondylolysis/spondylolisthesis: a comprehensive review with an anatomic focus. *Childs Nervous System*, 29(2), 209-216.
- Glasgow, L., Forde, M., antoine, S., Perez, E., Indar, L. (2013). Estimating the burden of acute gastrointestinal illness in Grenada. *Journal of Health Population & Nutrition*, 31(4) Suppl 1:S17-S29, ISSN 1606-0997.
- Griessenauer, C.J., Loukas, M., Scott, J.A., Tubbs, R.S., Cohen-Gadol, A.A. (2013). The artery of Davidoff and

- Schechter: an anatomical study with neurosurgical case correlates. *British Journal of Neurosurgery*, 27(6), 815-818.
- Griessenauer, C.J., Mortazavi, M.M., Loukas, M., Shoja, M.M., Watanabe, K., Tubbs, R.S. (2013). Heinrich Bircher (1850-1923) and the first description of a surgical approach to the cavernous sinus. *Childs Nervous System*, 29(10), 1923-1925.
- Griessenauer, C.J., Veith, P., Mortazavi, M.M., Stewart, C., Grochowsky, A., Loukas, M., Tubbs, R.S. (2013). Enlarged parietal foramina: a review of genetics, prognosis, radiology, and treatment. *Childs Nervous System*, 29(4), 543-547.
- Herbers, M., Hariharan, H., Matthew, V., Oliveira, S., Rovira, A., Sharma, R.N. and Ferguson, H.W. (2013). *Photobacterium damsela* in bigeye scad, *Selar crumenophthalmus* (Bloch, 1793) from Grenada, West Indies. *Journal of Fish diseases*. doi:10.1111/jfd. 12149.
- Igboechi, C., Vaddiparti, A., Sorenson, E.P., Rozzelle, C.J., Tubbs, R.S., Loukas, M. (2013). Tectal plate gliomas: a review. *Childs Nervous System*, 29(10), 1827-1833.
- Kabuusu R, Alexander R, Kabuusu A, Muwanga SN, Atimnedi P, Macpherson C. Effect of a wildlife-livestock interface on the prevalence of intra-erythrocytic hemoparasites in cattle. *Open Journal of Veterinary Medicine*, 3(8), 315-318.
- Louis, R.G. Jr, Tubbs, R.S., Mortazavi, M.M., Shoja, M.M., Loukas, M., Cohen-Gadol, A.A. (2013). Harvest of autologous claviopectoral fascia for use in duraplasty: cadaveric feasibility study. *Journal of Craniofacial Surgery*, 24(2), 619-621.
- Loukas, M., Bellary, S.S., Yüzbaşıoğlu, N., Shoja, M.M., Tubbs, R.S., Spinner, R.J. (2013). Ulnar nerve innervation of the medial head of the triceps brachii muscle: A cadaveric study. *Clinical Anatomy*, 26(8), 1028-1030.
- Loukas, M., Housman, B., Blaak, C., Kralovic, S., Tubbs, R.S., Anderson, R.H. (2013). Double-chambered right ventricle: a review. *Cardiovascular Pathology*, 22(6), 417-423.
- Loukas, M., Hulsberg, P., Tubbs, R.S., Kapos, T., Wartmann, C.T., Shaffer, K., Moxham, B.J. (2013). The tori of the mouth and ear: A review. *Clinical Anatomy*, 26(8), 953-960.
- Loukas, M., Sharma, A., Blaak, C., Sorenson, E., Mian, A. (2013). The clinical anatomy of the coronary arteries. *Journal of Cardiovascular Translational Research*, 6(2), 197-207.
- Macpherson, C., Akpınar-Elci, M. (2013). Impacts of climate change on Caribbean life. *American Journal of Public Health*, 103(1):e6. doi: 10.2105/AJPH.2012.301095
- Macpherson, C.C. (2013). Climate change is a bioethics problem. *Bioethics* 27(6), 305-308 (Published Online). doi:10.1111/bioe.12029.
- Macpherson, C.C. (2013). Climate change matters. *Journal of Medical Ethics*. (Published Online) .doi: 10.1136/medethics-2012-101084.
- Macpherson, C.N.L. (2013). Dogs, Zoonoses and Human Health: A global perspective – Mini Review. *CAB Reviews*, 8: 1-2.
- Macpherson, C.N.L. (2013). Epidemiology and Public Health importance of toxocariasis: a zoonosis of global importance. In: (Eds), Special Issue on Zoonoses. *International Journal for Parasitology*, 43(12-13), 999-1008.
- Malenfant, J., Walters, A., Kralovic, S., Robitaille, M., Schaefer, J., Tubbs, R.S., Loukas, M. (2013). Francesco Parona (1842-1908) and his contributions to our understanding of surgery through anatomy. *Clinical Anatomy*, 26(5), 547-550.
- Martin, S., Hogan, E., Sorenson, E.P., Cohen-Gadol, A.A., Tubbs, R.S., Loukas, M. (2013). Proboscis lateralis. *Childs Nervous System*, 29(6), 885-891.

- Matusz, P., Iacob, N., Miclaus, G.D., Pureca, A., Ples, H., Loukas, M., Tubbs, R.S. (2013). An unusual origin of the celiac trunk and the superior mesenteric artery in the thorax. *Clinical Anatomy*, 26(8), 975-979.
- Mian, A., Shoja, M.M., Watanabe, K., Rozzelle, C.J., Loukas, M., Tubbs, R.S. (2013). Robert Liston (1794-1847): surgical anatomist and resurrectionist with an interest in hydrocephalus. *Childs Nervous System*, 29(1),1-4.
- Oelhafen, K., Shayota, B.J., Muhleman, M., Klaassen, Z., Tubbs, R.S., Loukas, M. (2013). Benjamin Alcock (1801-?) and his canal. *Clinical Anatomy*, 26(6), 662-666.
- Osiro, S., Rodriguez, J.R., Tiwari, K.J., Rodriguez, I.I., Mathenge, N., Tubbs, R.S., Loukas, M. (2013). Is preoperative diagnosis possible? A clinical and radiological review of lymphoepithelial cysts of the pancreas. *Journal of the Pancreas*, 14(1):15-20.
- Osiro, S., Tiwari, K.J., Mathenge, N., Rodriguez, J.R., Tubbs, R.S., Loukas, M. (2013). When lithium hurts: a look at Ebstein anomaly. *Cardiology in Review*, 21(5), 257-263.
- Padmalayam, D., Tubbs, R.S., Loukas, M., Cohen-Gadol, A.A. (2013). Absence of the sagittal suture does not result in scaphocephaly. *Childs Nervous System*, 29(4),673-677.
- Sammy, I., Watson, H., William-Johnson, J., Paul, J., Dookeeram, D., Dookeeram, D., Bidaisee, S. (2013). Implementation of emergency training in the Caribbean: challenges, success and scope for the future. Paper presented at Commonwealth Medical Association "Unlocking the Potential of the Commonwealth" (Trinidad and Tobago Medical Association): Trinidad and Tobago July 4th 2013. *Caribbean Medical Journal* June 2013; 75(1):83
- Shoja, M.M., Benninger, B., Agutter, P., Loukas, M., Tubbs, R.S. (2013). A historical perspective: infection from cadaveric dissection from the 18th to 20th centuries. *Clinical Anatomy*, 26(2), 154-160.
- Shoja, M.M., Mortazavi, M.M., Malakpour, M., Loukas, M., Rozzelle, C.J., Tubbs, R.S. (2013). Andrew Fyfe the elder (1752(4)-1824): not all good anatomists are good teachers. *Clinical Anatomy*, 26(4), 418-422.
- Shoja, M.M., Sharma, A., Mirzayan, N., Groat, C., Watanabe, K., Loukas, M., Tubbs, R.S. (2013). Neuroanatomy of the female abdominopelvic region: A review with application to pelvic pain syndromes. *Clinical Anatomy*, 26(1), 66-76.
- Solomon, R., Giganti, M.J., Weiner, A., Akpinar-Elci, M. (2013). Water safety education among primary school children in Grenada. *International Journal of Injury Control and Safety Promotion*, 20(3), 266-270.
- Sorenson, E.P., Powel, J.E., Rozzelle, C.J., Tubbs, R.S., Loukas, M. (2013). Scalp dermoids: a review of their anatomy, diagnosis, and treatment. *Childs Nervous System*, 29(3), 375-380.
- Swergold, N., Sridharan, P., Loukas, M., Chamberlain, R.S. (2013). Advances in the Management of Pectus Deformities in Children. *Open Journal of Pediatrics*, 3, 211-223.
- Sylvester, W. R. B., Amadi, V., Pinckney, R., Macpherson, C.N.L., McKibben, J.S., Bruhl-Day, R., Johnson, R., and Hariharan, H. (2013). Prevalence, serovars, and antimicrobial susceptibility of *Salmonella* spp. from wild and domestic green iguanas (*Iguana iguana*) in Grenada, West Indies. *Journal of Zoonoses and Public Health*. doi: 10.1111/zph.12093
- Tirumandas, M., Sharma, A., Gbenimacho, I., Shoja, M.M., Tubbs, R.S., Oakes, W.J., Loukas, M. (2013). Nasal encephaloceles: a review of etiology, pathophysiology, clinical presentations, diagnosis, treatment, and complications. *Childs Nervous System*, 29(5),739-744.

- Tubbs, R.S., Bosmia, A.N., Loukas, M., Hattab, E.M., Cohen-Gadol, A.A. (2013). The inferior medullary velum: anatomical study and neurosurgical relevance. *Journal of Neurosurgery*, 118(2), 315-318.
- Tubbs, R.S., Cezayirli, P., Blackerby, W.T., Shoja, M.M., Loukas, M., Oakes, W.J. (2013). Govert Bidloo (1649-1713) and the first description of lipomyelomeningocele. *Childs Nervous System*, 29(8), 1219-1221.
- Tubbs, R.S., Chern, J.J., Muhleman, M., Loukas, M., Shoja, M.M., Oakes, W.J. (2013). Lateral compression of the foramen magnum with the Chiari I malformation: case illustrations. *Childs Nervous System*, 29(3), 495-498.
- Tubbs, R.S., Griessenauer, C., Loukas, M., Cohen-Gadol, A.A. (2013). The Circular Sinus: An Anatomic Study with Neurosurgical and Neurointerventional Applications. *World Neurosurgery*, S1878-8750(12)01341-1.
- Tubbs, R.S., Nechtman, C., D'Antoni, A.V., Shoja, M.M., Mortazavi, M.M., Loukas, M., Rozzelle, C.J., Spinner, R.J. (2013). Ossification of the suprascapular ligament: A risk factor for suprascapular nerve compression? *International Journal of Shoulder Surgery*, 7(1), 19-22.
- Tubbs, R.S., Prekupec, M., Loukas, M., Hattab, E.M., Cohen-Gadol, A.A. (2013). The indusium griseum: anatomic study with potential application to callosotomy. *Neurosurgery*, 73(2), 312-315; discussion 316
- Tubbs, R.S., Sharma, A., Griessenauer, C., Loukas, M., Shoja, M.M., Watanabe, K., Oakes, W.J. (2013). Kleeblattschädel skull: a review of its history, diagnosis, associations, and treatment. *Childs Nervous System*, 29(5), 745-748.
- Tubbs, R.S., Watanabe, K., Loukas, M., Cohen-Gadol, A.A. (2013). Use of the anterior interosseous artery for external to internal carotid artery bypass procedures: a cadaveric feasibility study. *British Journal of Neurosurgery*, 27(6), 791-794.
- Waechter, R.L., Goel, V., Raymont, V., Kruger, F., Grafman, J., 2013. Transitive inference reasoning is impaired by focal lesions in parietal cortex rather than rostrolateral prefrontal cortex. *Neuropsychologia*, 51(3), 464-471.
- Watson, C.C., Griessenauer, C.J., Loukas, M., Blount, J.P., Tubbs, R.S. (2013). William Watson Cheyne (1852-1932): a life in medicine and his innovative surgical treatment of congenital hydrocephalus. *Childs Nervous System*, 29(11), 1961-1965.

#### 10.4 Government, NGO Policy Reports, Knowledge Translation, Other (4)

- Doyle, E., Morrall C. and Baldwin. K. (2013). An Inventory of the Geographical Distribution and Conservation Status of Marine Turtles and Sharks in the Wider Caribbean and Relationship to Fisheries. Commissioned by WWF-MAR. 173 pp.
- Sealy, H. (2013). Co-authored the submission of the Chair of the Alliance of Small island States (AOSIS) - Nauru on recommendations for progress under Workstream 2 of the Ad Hoc Working Group of the Durban Platform for Enhanced Action (ADP).
- Sealy, H. (2013). Consultancy Report to the World Bank on the feasibility of a regional solar PV Nationally Appropriate Mitigation Action.
- Mitchell, J., Morrall, C., Nimrod, S., Weil, E. AGRAA, MACC and Reef Check. (2013). Grenada. In J. Jackson, Donovan, M., Cramer, K. and Lam, V. Status and Trends of Caribbean Coral Reefs 1970-2012 (184-186). Global Coral Reef Monitoring Network.

International Union for the  
Conservation of Nature, Washington,  
D. C. USA.

## Section 11.0

### Journals and Board Review Activity

#### 10.5 Magazine, Newspaper, and Mass Media Reports (2)

Cox-Macpherson, C., Bidaisee S.,  
Macpherson, C.N.L., (2013). Bioethical  
Reflections on Human Behaviour,  
Zoonotic Disease, and Climate  
Change. *Bioethics Caribe*, 6 (1).  
Macpherson, C.N.L. (2013). Making health a  
universal human right. *Oped Defex*  
March 25<sup>th</sup>.

**Dr. Muge Akpınar-Elci:** American Journal of  
Respiratory and Critical Medicine, The  
Archives of Environmental and Occupational  
Health, Chest.

**Dr. Francis Fakoya:** Journal of Anatomical  
Sciences

**Dr. Martin Forde:** Environmental Monitoring  
and Assessment.

**Dr. Svetlana Kotelnikova:** Earth Science  
Reviews, Elsevier, International Journal of  
Systematic and Evolutionary Microbiology

**Dr. Marios Loukas:** Clinical Anatomy (Ad Hoc  
Reviewer, 2003-2005; Associate Editor, 2006-  
2012; Co-Editor, 2012-present), Surgical and  
Radiologic Anatomy (Reviewer, 2003-present,  
International Advisory Board 2006-present),  
Neuroanatomy (Associate Editor, 2003-  
present), International Journal of Experimental  
and Clinical Anatomy (International Advisory  
Board, 2007-present), Clinical Medicine Case  
Reports (Honorary Editorial Board, 2008-  
present), *Turkiye Klinikleri Journal of Medical  
Sciences* (Advisory Board 2009-present),  
*Journal Biomedicine International* (Co-Editor,  
2009-present), *Polish Annals of Medicine*  
(Scientific Board, 2010-present), *European  
Journal of Anatomy* (Co-Editor, 2011-present),  
*European Journal of Surgical Research*  
(Reviewer, 2006-present), *Journal of Brachial  
Plexus and Peripheral Nerve Injury* (Reviewer,  
2007-present), *Journal of Anatomy* (Reviewer,  
2007-present), *Pain Practice* (Reviewer, 2007-  
present), *Medical Science Monitor* (Reviewer,  
2007-present), *Indian Journal of Plastic  
surgery* (Reviewer, 2007-present), *American  
Journal of the Medical Sciences* (Reviewer,  
2007-present), *Clinical Rehabilitative Tissue  
Engineering Research* (Reviewer, 2007-

present), Life Sciences (Reviewer, 2007-present), Current Urology (Reviewer, 2007-present), World Journal of Surgery (Reviewer, 2008-present), World Journal of Emergency Medicine (Reviewer, 2008-present), Acta Neurochirurgica (Reviewer, 2008-present), Turkiye Klinikleri. Journal of Ophthalmology (Reviewer, 2009-present), Journal of Clinical Medicine and Research (Reviewer, 2009-present), Anatomical Record (Reviewer, 2009-present), International Journal of Cardiology (Reviewer, 2009-present), Journal of Neurosciences in Rural Practice (Reviewer, 2009-present), Case reports in Medicine (Reviewer, 2010-present), Malaysian Journal of Medical Sciences (Reviewer, 2010-present), Journal of Clinical Anesthesia (Reviewer, 2010-present), European Journal of Radiography (Reviewer, 2010-present), Pace (Reviewer, 2010-present), Anatolian Journal of Cardiology (Reviewer, 2010-present), Journal of Hand and Microsurgery (Reviewer, 2010-present), Medical Science Educator (JIAMSE) (Reviewer, 2010-present), Anatomical Science International (Reviewer, 2010-present), Medical Hypotheses (Reviewer, 2010-present), Archives of Medical Science (Reviewer, 2011-present), Case reports in Radiology (Reviewer, 2011-present), Anatomy Research International (Reviewer, 2011-present), International Journal of Medicine and Medical Sciences (Reviewer, 2011-present), Advances in Physiology Education (Reviewer, 2011-present), Intercontinental Journal of Medicine and Medical Sciences (Reviewer, 2012-present), Croatian Medical Journal (Reviewer, 2012-present), Osteoarthritis and Cartilage (Reviewer, 2012-present), Clinical Oral Implants Research (Reviewer, 2012-present), BMC Medical Education (Reviewer, 2012-present), Circulation (Reviewer, 2013-present), BioMedical Research International (Reviewer, 2013-present), Clinical Medicine Insights: Cardiology (Reviewer, 2013-present).

**Dr. Calum Macpherson:** Acta Tropica, Annals of Tropical Medicine and Parasitology, BMC Infectious Diseases, Emerging Infectious Diseases, Epidemiology and Infection, Gastroenterology, International Journal for Parasitology, Journal of the Caribbean Veterinary Medical Association, Lancet, Parasitology International, Small Animal Practice, Transactions of the Royal Society of Tropical Medicine and Hygiene, Trends in Parasitology, Veterinary Record.

**Dr. Theresa McCann:** Medical Education (Reviewer), Injury Prevention (Reviewer).

**Dr. Clare Morrall:** Revisita de Biologia Tropical (the International Journal of Tropical Biology and Conservation).

**Dr. Randall Waechter:** Child Abuse Review, Child Welfare, Youth and Society, First Peoples Child & Family Review

## Section 12.0

### Thesis Defenses (1)

Steve Miller, MSc candidate: "The correlation of anthropogenic and environmental factors with human pathogenic antibiotic-resistant bacteria in the mongoose, *Herpestes auropunctatus*, in Grenada, West Indies." 20 November, 2013.

Michael Drake, MSc candidate: "Parasitological and bacteriological survey of the cane toad, *Rhinella marina*, in Grenada, West Indies." 5 December, 2013.

## Section 13.0

### Graduate Seminars (33)

Kareem Coomansingh, MPH: "Introducing the IRB: Friend or Foe?" 9 January, 2013.

Ged Corcoran, MD: "Clinical Bioethics in Palliative Care." 23 January, 2013.

Angus Dawson, PhD: "What is Public Health Ethics?" 30 January, 2013.

Darshan Mehta, MD, MPH: "Remembered Wellness: What Does it Mean for a Provider to be Well?" 6 February, 2013.

Sebastian Kreitzschitz, MD: "Neuroenhancement in Healthy Individuals." 6 February, 2013.

Prof. Ian McConnell, BVMS, MRCVS, PhD, FRCPATH, FRSE, F Med Sci, Emeritus Professor of Veterinary Science, Department of Veterinary Medicine, University of Cambridge: "The interdependence of animal and human health." 13 February, 2013.

Robert Veatch, PhD: "Equipoise in Clinical Trials: The Moral." 19 February, 2013.

Gwendolyn Quinn, MD: "Cancer Communication Outreach Activities Between Moffitt Cancer Center and Puerto Rico." 20 February, 2013.

Gerry Rayman, MB, BS, MD, FRCP: "A national Programme to Reduce the Variation in Amputations in the UK." 27 February, 2013.

Roger Radix, MD & Richard Scribner, MD: "The Grenada School Nutrition Study: Update and Discussion." 6 March, 2013.

Mary Glenn, PhD: "Hospital Acquired Infections: A New Model for Monitoring." 9 April, 2013.

Mary Glenn, PhD: "Comparisons of Mona Monkeys in Africa and the Caribbean." 9 April,

2013.

John Penn, PhD: "How to Write a Compelling Grant Proposal: Government Funding and Beyond." 10 April, 2013.

Andrea Easter-Pilcher, PhD: "About CITES: A Delegate's View of the Global Treaty for International Trade in Endangered Species." 24 April, 2013.

Karla Farmer, MSc Candidate: "One in a Million - Choosing the Best One." 21 August, 2013.

Dave Lennon, PhD: "Bioterrorism, Past, Present and Future." 11 September, 2013.

Abboud J. Ghalayini, Ph.D: "Writing a Research Grant Proposal." 18 September, 2013.

Shanice McKain, MSc Candidate: "Horizontal Gene Transfer." 25 September, 2013.

Karla Farmer, MSc Candidate: "Metagenomics: Peeling Away the Mystery." 2 October, 2013.

Amit Chhabra, JD: "Biosecurity and Chemical Weapons." 9 October, 2013.

Ray M. Kaplan, DVM, PhD, DACVM, DEVPC: "Anthelmintic Resistance in Nematode Parasites of Animals is Out Of Control: Can We Use the Knowledge Gained to Prevent the Same From Happening in Helminth Parasites Of Humans?" 16 October 2013.

Danny Gohel, Professor & Head of Department of Medical Science, Tung Wah College, Hong Kong: "Transitional Cell Carcinoma of the Urinary Bladder and Adjuvant Immunotherapy." 7 November, 2013.

Amit Chhabra, JD: "Drugs and National Security." 13 November, 2013.



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