



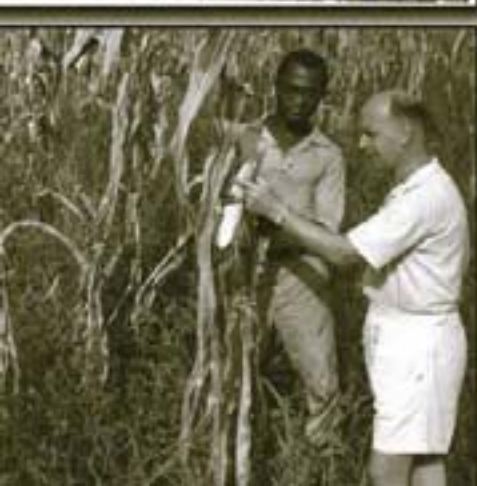
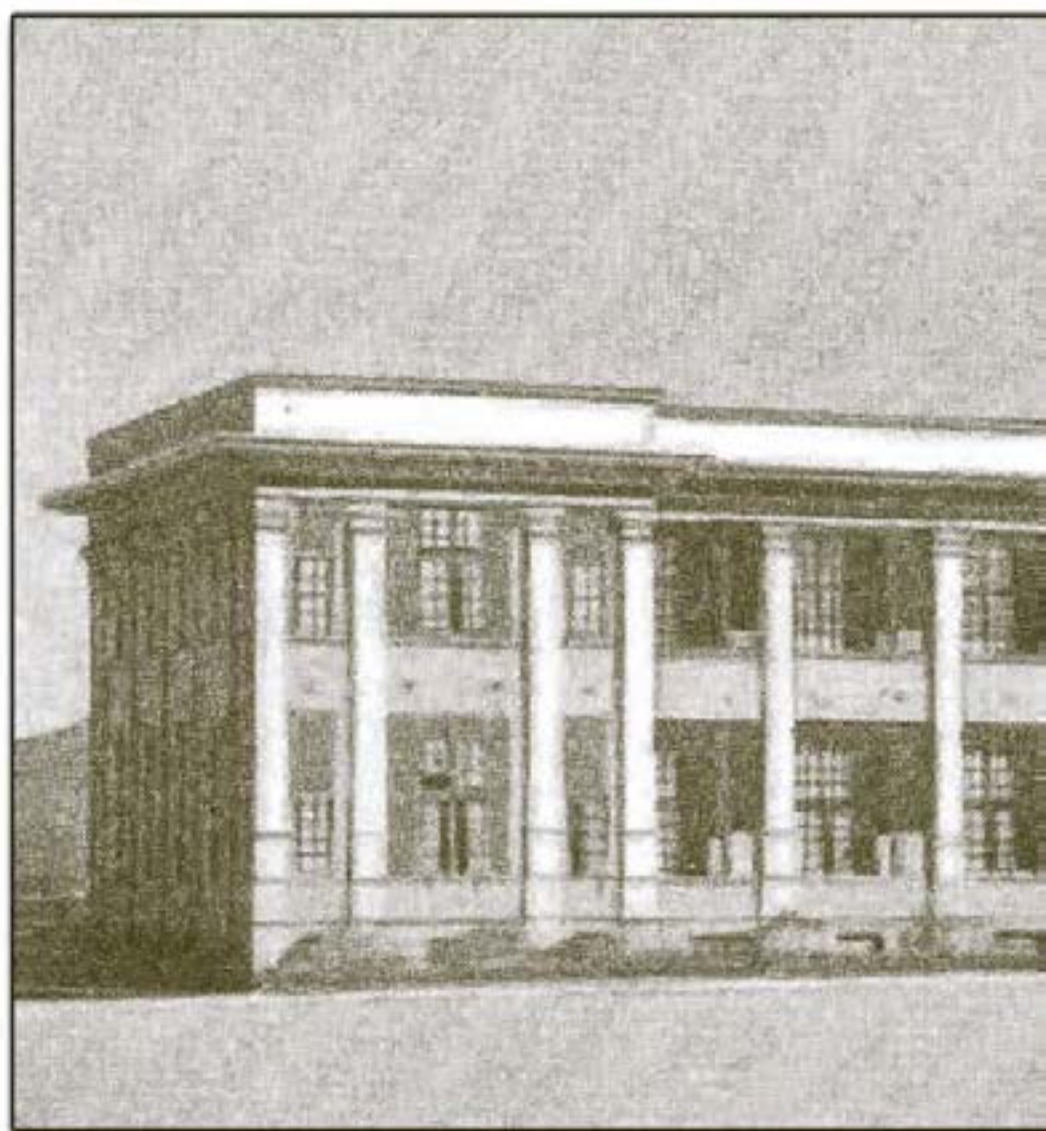
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ST. AUGUSTINE CAMPUS

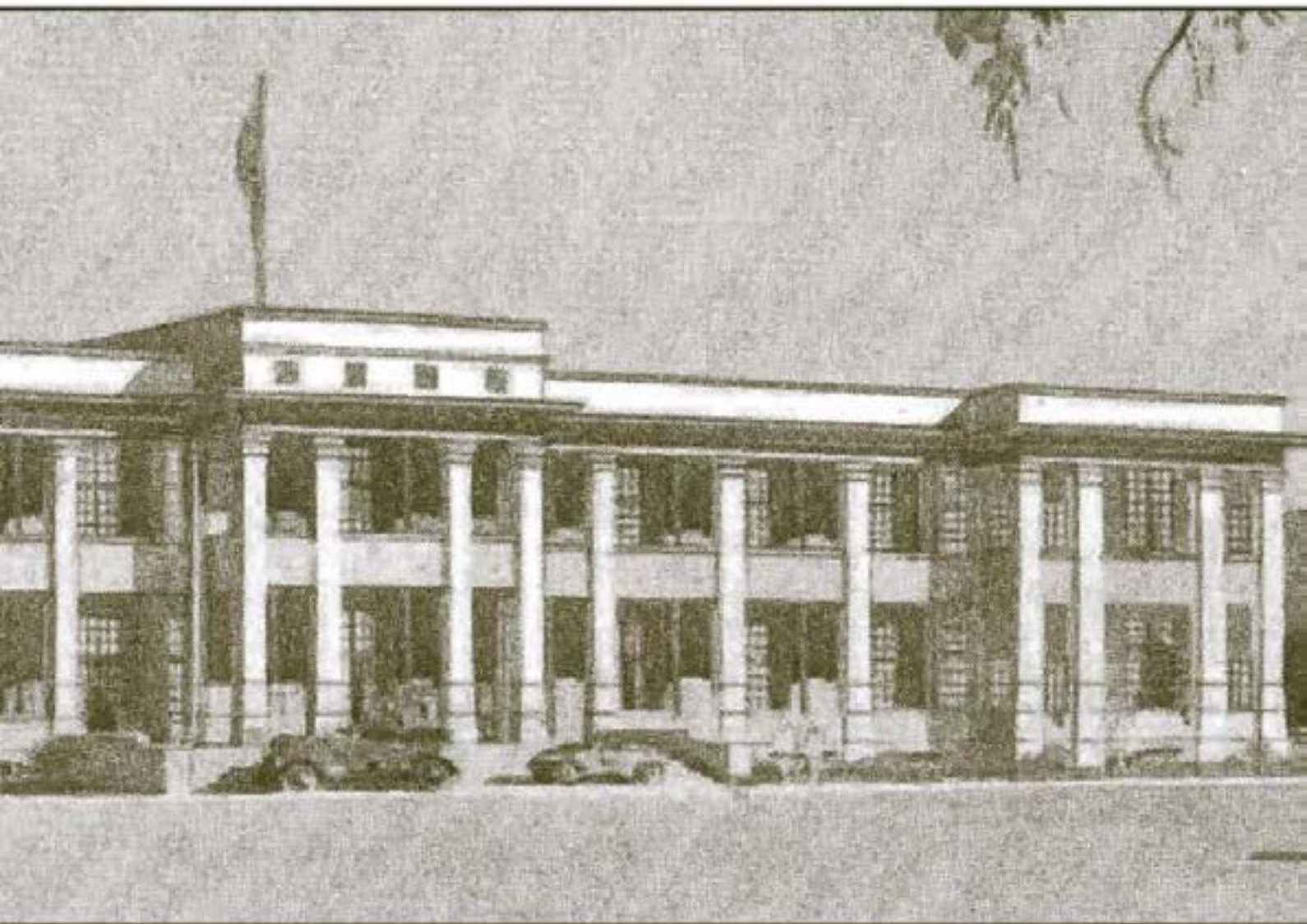
DECADES OF RESEARCH

UWI ST. AUGUSTINE AT 50



FIFTY AND
FORGING AHEAD
1960-2010







Editor: **Patricia Mohammed**

Commissioned by the Office of the Campus Principal, Professor Clement Sankat

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Editor's Note

The School for Graduate Studies and Research is pleased to be associated with this research publication, the brainchild of Professor Clement Sankat, Principal of the University of the West Indies in its 50th year.

My thanks to the Professors, Heads and Deputy Deans, who responded to our repeated requests for individual assessments of their research profiles. Some entries had to be edited to accommodate the creative space for a visual display of their versatility and achievements.

My own special thanks to the following for working closely with me on the various aspects of the project: Khellon Roach, Stacy Kennedy from the Principal's office, Renata Sankar, Johann Bennett and Nicole Boucaud-Huggins from Marketing and Communication, Roxanne Maloney-Eddy from the School for Graduate Studies and Research provided valuable administrative and logistical support, Dr. Georgina Chami for her editorial eye, while Owen Bruce, Arthur Subnaik and Aneel Karim supplemented images with their generous photographic talents. And to Hayden Louis of Hott Source for his kind services.

Patricia Mohammed
Campus Co-ordinator, Graduate Studies and Research
UWI St Augustine



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Decades of Research

U.W.I St. Augustine

As Vice Chancellor, I have had opportunity to celebrate many extraordinary achievements of our regional institution. There is however, something extra special about marking anniversaries, and I am thrilled to have been privileged to share in celebrating proud milestones such as this the 50th Anniversary of our St. Augustine Campus.

So often throughout the St. Augustine Campus' Golden Jubilee celebrations, I spoke of reflecting on this remarkable 50-year journey of our second campus and its contribution to shaping our leaders, shaping knowledge, solutions and ground-breaking research and through all this, helping to shape our region and future.

It is half-century since that historic merger between the Imperial College of Tropical Agriculture (ICTA) and the University College of the West Indies (UCWI), which formally began the UWI St. Augustine Campus in 1960. We are extremely conscious of our heritage and uniqueness as the University of the Region and the vision of our founding fathers in the establishment of such an institution. We understand our mandate as The University of the West Indies, and remain committed to fulfilling our ageless mission to propel the development of West Indian society through teaching, research, innovation and intellectual leadership.

Research and innovation is part of our fabric, as core focus areas outlined in our University's current transformative strategic plan. Today, across our region and the globe, we confront some of the greatest crises and most daunting challenges of all times. I am delighted to join with the publishers and editorial team behind this publication to celebrate some of our University's and region's finest, brightest, most dedicated researchers and thinkers. This publication gives credence to a boast that I've made many times before, in stating that we have some of the world's greatest here at our institution, who provide the talent and promise, not only to solve today's crises, but to sustain us as the Caribbean's leading university for tomorrow.

The team at UWI St. Augustine that conceptualised and created this publication must be commended for certainly, I can think of no better way to immortalise the contribution of the campus as the publishing of this special book.

This 50th Anniversary research publication provides a medium for sharing some of our University's cutting-edge research output and a platform for highlighting



Professor Nigel E. Harris
Vice Chancellor, The University of the West Indies

some of the creativity, innovation and intellectual talent that resides within our University. It gives us an opportunity to shine the spotlight on our committed, passionate academics and innovators, some of whom toil quietly in the background, but who make enormous contributions to helping us to meet our mission and strategic aim to become an internationally recognised centre of excellence in research, knowledge creation on matters related to the Caribbean and small island developing states.

The book is also a melting pot, so characteristic of our very region and regional institution. It blends into such a beautiful, harmonious whole, a cross-section of personalities and research accomplishments across the various disciplines—applied sciences, liberal arts, humanities and social sciences.

To those featured within these pages, I say "*Congrats, Well done, Keep up the good work*". And to the entire St. Augustine Campus, my warmest congratulations again on its 50th Anniversary milestone.



1960-2010

Fifty and forging ahead



message from
Clement Sankat
Pro-Vice Chancellor and Principal

Engaging in research and promoting its application in society are central functions of all leading universities. For the past five decades, The University of the West Indies St. Augustine Campus has undertaken research in a wide range of disciplines, from tropical agriculture to engineering and the environment, humanities, cultural arts and industries, education, social sciences, medical sciences and law. In addition to the range of taught programmes, technical advisory services and activities to stimulate intellectual discussion and debate with our key stakeholders, the Campus has consistently sought to make a meaningful contribution to national and regional development.

On the occasion of the fiftieth anniversary of the UWI St. Augustine Campus and in commemoration of the merger of the Imperial College of Tropical Agriculture (ICTA) and the University College of the West Indies (UCWI) on October 12, 1960, the UWI St. Augustine Campus launched a range of initiatives and activities to pay tribute to the many students, staff members and stakeholders who helped to grow our institution from a single Faculty Campus with less than 70 students to a Campus that is on the cusp of having six full Faculties with more than 17,000 students.

Great Pride

It is only fitting, therefore, that this publication entitled “Decades of Research: UWI St. Augustine at 50”, which encapsulates in a succinct way the wealth of institutional research, intellectual engagement and scholarly activities of our professoriate, be compiled with a view to highlighting the consistent focus of the Campus on research, development, creativity and innovation. Such a publication has never before been produced for our Campus and it is with great pride that we are able to share this with our wider community as we mark our golden fiftieth anniversary.

Of course, over the past five decades, our Campus has gone through many changes—physically, demographically and even structurally—but our commitment to quality teaching, learning, graduate studies and research, has remained constant. In fact, the more dramatic changes in the external environment, including the global thrust towards developing knowledge-based economies, the increased mobility of highly skilled personnel regionally and globally, the effect of information and communication technologies on all aspects of life, and the intense competition in the tertiary education market, have meant that the UWI St. Augustine Campus, like other universities, has had to continually adjust, adapt and re-focus its activities to better anticipate and respond to the needs of our stakeholders. Refreshing



and realigning what we do is always a work in progress.

More specifically, in today's dynamic and competitive environment, research quality, research intensity and the relevance of research and its applications are even more important as factors that distinguish outstanding tertiary institutions, allow universities to effectively compete for research funding, hire quality staff internationally and be well-integrated into national and regional innovation systems. While the UWI St. Augustine Campus has made significant strides in advancing its research in a broad range of disciplines, the Campus continues to work assiduously at improving its research output and particularly, its impact.

As Campus Principal, these are issues that are of strategic importance in order to ensure that the UWI St. Augustine Campus is well-positioned to maintain its preeminence as a regional tertiary institution. We have already begun a process to review and reinvigorate the Campus' research agenda, to develop specific multi-disciplinary clusters, enhance funding opportunities and alignment, explore increased partnerships with international funding agencies and the private sector and mentor young academic staff and students who will push the frontiers of intellectual curiosity. This, together with a robust institutional framework and our UWI brand, are essential elements to improve the effectiveness of our research, its impact and reach and the contribution of our university to improving the lives of people in Trinidad and Tobago and the wider Caribbean.

Clement Sankat

Professor of Food and Agricultural Engineering



As a researcher myself for nearly 40 years my passion in Mechanical and Manufacturing Engineering has been the quest for new knowledge and its application with the specific aim to reduce the travail and routine of manual labor, to develop new products and processes particularly in the field of food and agriculture, and to make these competitive.

This burning interest and curiosity to explore new concepts and meet pressing needs, work directly with communities and stakeholders, develop new technologies, engage in discussions with other academics internationally and publish research findings in academic journals and at conferences, represent the experience that I have sought to share with both my undergraduate and postgraduate students and colleagues throughout my own career as Lecturer, Head of Department, Dean and Pro Vice Chancellor for Graduate Studies.

Whether it was through the development of a bagasse-based ruminant feed for the sugar industry, the creation

of nutmeg crackers for the nutmeg industry in Grenada, the design of post-harvest technology for handling and storing breadfruit, mango, papaya or the pommerac for the benefit of Caribbean exporters, or the invention of hybrid solar crop dryers for the agricultural industry in the Caribbean, my primary impetus was to contribute to developing new approaches and new technologies for a dynamic food and agriculture sector in Trinidad and Tobago and the Caribbean.

My own experience has evolved along a continuum of basic and applied research and innovation all driven by societal needs. I have also experienced the multiple joys of the passionate pursuit of a research agenda—stimulating teaching, research grants, peer reviewed/publications and recognition, receptive audiences and the acceptance of one's work by industry. I would do this all over again if I had to in the hope that these efforts could help to enhance the lives of some.





CLEMENT SANKAT

Pro Vice Chancellor
Campus Principal
Professor of Food and
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Faculty of Engineering

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I do hope that the various descriptions and personal accounts of the outstanding work being conducted by some of our other Professors at the UWI St. Augustine Campus, which are outlined in this publication, serve to inspire young researchers and academics to pursue their research interests ardently and vigorously, to look for new opportunities to share their scholarly work with other students, academics and researchers far and wide, to be proactive in mobilising resources to expand the scope and deepen the impact of their research and innovative work, and to seek ways of translating their scholarly work into creative development outcomes that contribute not only to advancing their particular discipline but also to improving our societies.

Against this background, I would like to thank my colleagues, the Deputy Deans for Graduate Studies and Research and the various Professors whose work is showcased in this publication, for their support for this publication and more broadly, for their contribution to the Campus' research initiative.

The distinction of being recognised as leaders in the academe is accompanied

by the responsibility to guide, promote and facilitate research and innovation among our staff and students and to enhance the international competitiveness of the UWI St. Augustine Campus and our University.

Without a doubt, we need to keep reinventing ourselves and developing new scholars to mentor our young student population.

I would also like to express my sincere appreciation and gratitude to all those who were instrumental in making this very important publication possible - our Campus Coordinator for Graduate Studies and Research, Professor Patricia Mohammed for graciously accepting to spearhead this initiative, the graphic design company, Hott Source, our Marketing and Communications Department as well as Mrs. Stacy Richards-Kennedy and Mr. Khellon Roach from the Office of the Campus Principal for their dedication and steadfast commitment to this 50th anniversary project.

The UWI St. Augustine Campus is "Fifty and Forging Ahead".

Professor Sankat's full bio can be found at <http://www.sta.uwi.edu/principal>

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Faculty of Science and Agriculture



Dr. Anderson Maxwell
Dean, Graduate Studies
and Research

Introduction:

The Faculty of Science and Agriculture was formed out of the 1996 merger of the former Faculties of Agriculture and Natural Sciences. With its six academic departments and one research unit, it is currently a strong, productive, research-oriented Faculty. Selected work being pursued by staff in the Faculty is presented below.

Department of Agricultural Economics and Extension

The Department of Agricultural Economics and Extension has six research pillars:

- (I) Human nutritional status and the impact of nutritional interventions.
- (II) Impact of climate change on food systems and the risk environment for farming.
- (III) Natural resource and environmental management.
- (IV) Trade policy and its impact on the regional agricultural sector.
- (V) Farmer education strategies
- (VI) Regional food security.

Research has focused on strengthening the tourism sector through linkages with the agricultural sector thus promoting eco- and agro-tourism, on the role and effectiveness of farmer field schools as an extension tool and a study is being carried out of the options to support the expansion of the cocoa industry in Trinidad and Tobago through a technical vocational programme. The department continues its research on intervention to foster healthy dietary and physical activity habits in children and assess the nutritional status of at risk groups.

Research on sustainable watershed management will be intensified through a recent grant from the European Development Fund in which the Department will partner with the University of Wageningen, CIRAD of Martinique and the Governments of Trinidad and Tobago and Haiti. Studies continue on rising food prices and food security in the region.

Department of Food Production

The major research areas of the Department of Food Production are:

- (I) Soils and Environmental Sciences
- (II) Food security and agricultural diversification
- (III) Geography
- (IV) Education

Soils and Environment Sciences research include hydrology, soil and water relations, soil conservation and

watershed management, and assessment of new tools for soil mineral and nutritional requirement determination. Recent studies are being conducted on the management of soil properties for improved cricket turf wickets. Integrated approaches to weed control are being developed. Breadfruit research aimed at commercialisation includes improved propagation methods of micropropagation, germplasm evaluation and value-addition through products such as flour.

Postharvest physiology and technology studies focus on the handling of horticultural products and root tubers from harvest to the customer while livestock research has focussed on increasing efficiency in feeding systems for ducks and small ruminants, and on rabbits. New findings on neotropical wildlife will contribute significantly to conservation and to commercial wildlife farming as a potentially lucrative source of income.

In 2005, Geography was introduced into the department expanding the synergies of research. In education, action research on new approaches to teaching, including on-line delivery, is being conducted to improve students' learning.

The Cocoa Research Unit (CRU) has focused in four major areas and has led to significant achievements in the following:

Disease resistance: an understanding of the mechanism and inheritance of resistance to blackpod and witches' broom diseases and to the identification of molecular markers for disease resistance. Screening methods for identifying resistance to these diseases have been developed and are now universally accepted as standard methods for this purpose.

Flavour and flavour chemistry: Methodologies for the assessment of various flavour attributes have been developed using a standardised organoleptic taste panel. Studies focused on the understanding of the effect of genotype, growing locations and processing on the development of fine flavour attributes in cocoa have shown that while certain flavour attributes are genotypically determined others are determined by growing environment and processing methods. A study of the male and female parent effects on flavour development has showed that flavour is a function of primarily the female parent effects.

Molecular genetics: A large proportion of the accessions at the Unit has been fingerprinted using SSR and SNP markers towards identifying Phylogenetic groups within the ICG,T. The molecular information has been used in linkage disequilibrium analysis to identify molecular markers linked to

various morphological, physiological and agronomical traits.

Taxonomy: The accessions at the ICG,T are being characterised taxonomically using a subset of taxonomically important descriptors to differentiate populations and accession within populations.

Department of Chemistry

The main research pillars of the Department of Chemistry are:

- (I) Natural Products, Synthesis and Medicinal Chemistry
- (II) Inorganic complexes for industrial and other applications
- (III) Environmental Studies.
- (IV) Biosensors.

Investigation of selected plants, marine organisms and brackish water microorganisms with the aim of discovering compounds with pharmaceutical potential and other useful products has been ongoing. New research in the area of targeted design and synthesis has yielded a family of promising antitumour compounds and carbohydrate candidate drugs against dengue fever and tuberculosis.

Transition metal complexes with perfluoroalkylphosphine, squarate and macrocyclic aza ligands have been synthesised with an improved route to the perfluoroalkylphosphine type ligands developed. A major international energy company has funded the study of the catalytic ability of these ligand complexes. The squarate complexes have been evaluated for antitumour activity and use in glucose sensors.

Lead monitoring and remediation research proved its relevance with the discovery of a contaminated site in Waller Field. The department responded to this crisis by providing expertise to support site cleanup and monitoring patient blood lead levels during treatment.

Ongoing collaborations include studies of heavy metals contamination analysis and chemical flavour profile determination of cocoa beans with the Cocoa Research Unit and the impact of endocrine disrupting substances on selected aquatic fauna with the department of Life Sciences.

Department of Life Sciences:

The Department of Life Sciences has two main research pillars:

- (I) **Small island biodiversity, environmental and natural resource management.**

This research targets the biodiversity and ecosystem

services that support human well-being. The objective is to contribute to sustainable development and knowledge dissemination to the wider community. For example, the National Herbarium at UWI has coordinated the resurvey of the entire vegetation of Trinidad and Tobago and placed the complete new specimen database online to support ecosystem conservation. The Department has also worked with the Environmental Management Authority to initiate restoration and carbon sequestration in the Nariva Swamp through reforestation by local communities.

(II) **Biotechnology and Molecular Biology for agricultural improvement, human health and wellness.**

This research concentrates on developing biotechnology products including genetically improved papaya, anthurium, breadfruit, cassava, sweet potato and hot pepper.

In addition, biotechnology is being used to develop diagnostic services for human, veterinary and plant diseases and in the management of genetic diversity in forestry, aquaculture and fisheries.

With regard to health and wellness, research is proceeding on the molecular genetics and ecology of dengue vectors as well as dengue fever outbreaks. Im-

portant research contributions have also been made on health related metabolic diseases such as diabetes and the potential influence of factors such as racial origin.

Department of Mathematics and Computer Science

The major research pillars in the department are:

- (I) Applied Mathematics
- (II) Combinatorics and Graph theory
- (III) Statistics
- (IV) Human-Computer interactions
- (V) E-learning
- (VI) Networking
- (VII) Parallel and distributed computing
- (VIII) Computer and mobile technology for Health-care management

Research in fluid mechanics has been applied to the flow of oil in pipelines and the flow of lubricants in joints (eg the hip). Expertise in the area of graph theory and combinatorics has been applied to scheduling problems (at PTSC) and to solving traffic problems.

In the area of Statistics focus has been on health statistics, hypothesis testing and multivariate statistical inference and more recently bioinformatics and statistical genetics. Human Computer interaction has emerged as



another area of research and work in the recently established Usability Lab has been going apace. A multi-disciplinary e-learning cluster led by staff in the department has developed an open source software tool, called Burrokeet, which enables e-learning materials in various formats to be consolidated into an e-learning package for course delivery. Another exciting development has been the “MediNet system” which links patients in widely separated locations via cell phones with their doctor.

Department of Physics

The major areas of research in the department are as follows:

- (I) Materials Science
- (II) Medical Physics
- (III) Astronomy and Astrobiology
- (IV) Environmental Physics and Alternative Energy
- (V) Electronics
- (VI) Pure Physics

Extensive research has been conducted on Trinidad clays resulting in the characterisation of many structures and properties and assessment of their suitability for use in various ceramic products. Polymer electrolytes and their composites have been prepared and utilised as membranes for testing in the Fuel Cell research

programme, which has been very productive to date.

In the Medical Physics area, a method has been developed using photoplethysmography to assess the efficiency of blood circulation in various organs of the body.

In other work, a Superconducting Quantum Interference Device (SQUID) has been demonstrated to be a useful and more informative alternative to ECG for diagnosis of heart conditions. Solar Thermal Energy research has produced a commercial timber dryer and prototypes of a solar cooker and solar refrigerator. Staff in the department have obtained several patents including those for a graphite lubricant, asphalt sealant and a solar light box.

In addition, a team from the department has won a UNESCO sponsored prize for a cheap, efficient and accessible method for water purification and three outstanding science documentaries (*Adventures in Discovery*, *Wild and Wonderful* and is number) have been produced. Work has been initiated and is ongoing in the following areas: astrobiology and mud volcanoes, geothermal energy and wind energy potential for the Caribbean, solar distillation, regional climate analyses and impact studies and Digital Signal Processing in the recently established Very Large Scale Integration Lab (VLSIL).



John Agard

Professor - Tropical Island Ecology
Head, Department of Life Sciences



Professor John Agard's research spans more than two decades. It has been broadly focussed on the area of sustainability science with an emphasis on environmental management methods and tool development, ecosystem services marketing and climate change adaptation.

Sustainability science is the study of the complex coupled interactions between humans and nature and is driven by concerns about finding the right balance between conserving nature and providing for the needs of society. Through research and application at the University of the West Indies, Professor Agard has contributed to mainstreaming environmental sustainability in development planning at international, regional and local levels.

At the international level, Professor Agard has interfaced scientific knowledge with practical experience through participation in major integrated environmental assessment exercises aimed at synthesising environmental science to inform policy and decision making. He has served as a lead author in the 4 volumes on 'Ecosystems and Human Well-being' published by Island Press for the *Millennium Ecosystem Assessment* (MA) in 2005 (see Vol. 1, Chapter 23: Island Systems, pg. 663-680; Vol. 2, Ch. 9: State of the art in describing future changes in ecosystem services, pg. 71-115; Vol. 2, Ch. 12: Interactions among Ecosystem Services, pg. 431-448; Vol. 4, Ch. 10, Sub-Global Scenarios, pg. 229-259).

He also served as a Coordinating Lead Author of Scenarios development in the *Global Environmental Outlook* (GEO-4) published by UNEP in 2007 (see. Ch. 9: The Future Today, pg 395-454). This major project was able to coordinate consultations and data collection in five international regions as inputs to six global computer models that were inter-linked to project a wide range of environmental and socio-economic indicators under four plausible scenarios for the future up to 2100.

Professor Agard is also a Lead Author of the Small Islands Chapter of the *Fourth Assessment Report of the In-*

ter-Governmental Panel on Climate Change (IPCC) published by Cambridge University Press. His contribution on small island biodiversity supports the case that Small Island Developing States (SIDS), because of their intrinsic characteristics are among the most vulnerable group of countries to projected global climate change. His work continues to be acknowledged by his peers and he has been selected again as a Lead Author in the 5th Assessment of the IPCC beginning in 2010. The Millenium Ecosystem Assessment (MA) authors were awarded the Zayed Prize for the Environment while the IPCC and Al Gore shared the 2007 Noble Peace Prize. Building on the knowledge gained from these experiences, Professor Agard is currently an independent advisor on Environment and Sustainability to the Inter-American Development Bank in Washington.

At the regional level, Professor Agard was co-leader of the Caribbean Sea Ecosystem Assessment (CARSEA), a sub-global study of the Millennium Ecosystem Assessment published in 2007 (see Caribbean Marine Studies, Vol. 8:1-85). The policy advice from this study has contributed to the formation of the Caribbean Sea Commission by the Association of Caribbean States, to advance the cause of integrated management of the Caribbean Sea.

His work on scenarios development and modelling of plausible future projections in environmental and socio-economic indicators in Latin America and the Caribbean continues with the 2010 publication (Ch. IV, Scenarios, pg. 227-274) of the Latin America and Caribbean Environment Outlook (GEO-LAC 3) by the UNEP Regional office for Latin America and the Caribbean. He is also a collaborator with the Caribbean Community (CARICOM) Secretariat and the Caribbean Community Climate Change Centre (CCCCC) in pursuing a sub-regional sustainable development agenda.

At the local level, Professor Agard has directly influenced science in the public domain through the creation of environmental policy, laws and systems.



This was his main public service contribution as Chairman of the Environmental Management Authority of Trinidad and Tobago for three terms between 1998 and 2008 while continuing to perform his primary teaching and research duties at UWI.

As the non-executive Chairman of the Environmental Management Authority (EMA), Professor Agard used his research and experience to lead and contribute to the development of the National Environmental Policy 1996 and revised 2007, the Certificate of Environmental Clearance Rules 2001, the Environmentally Sensitive Areas Rules 2001, The Environmentally Sensitive Species Rules 200, the Noise Pollution Rules 2001 and the Water Pollution Rules 2001.

Professor Agard's early career research focussed on marine biology and ecotoxicology with emphasis on developing methods for detecting the sub-lethal effects of oil pollution on benthic ecology. The collaborative research group found that the entire seabed of the south Trinidad coastline of the Gulf of Paria is heavily polluted by oil (Agard, Boodosingh and Gobin, *Marine Pollution Bulletin* 19: 231-233, 1988). However, studies show that species found around natural oil seeps at La Brea have adapted to these conditions with no signs of ill effects while disturbance of ecosystem structure is clearly indicated around polluted areas near oil refineries and cities (Agard, Gobin and Warwick, *Marine Ecology Progress Series* 92: 233-243, 1993).

This research informed the development

of new treatment methods to reduce the toxicity of these effluents. This small sample of studies indicates that Trinidad and Tobago has cause for concern about the coastal environment and more holistic development planning to find a better balance between development and environment than at present.

These marine pollution studies were intermixed with a number of well cited theoretical and methodological papers on the nature of adaptation to the environment in marine invertebrates. The methods described in one or more of these papers are positively cited in the standard marine community analysis reference manual of the National Environment Research Council (NERC) of the UK, the standard environmental effects monitoring manual of Environment Canada and the US EPA in their Estuarine and Coastal, Bio-assessment and Bio-criteria Technical Guidance Manual.

Current Research Plans are focussed on developing markets for ecosystem services with an emphasis on non-carbon markets and with the ultimate intention of introducing ecosystem services valuation into national economic and planning frameworks. Two main research projects are:

- Nariva Swamp Restoration, Carbon Sequestration and Livelihoods Project which is funded by the Green Fund of Trinidad and Tobago with initial support from the World Bank.
- Project for Ecosystem Services (ProEcoServ), which is funded by the Global Environment Facility.



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Balswaroop Bhatt

Professor - Mathematics
Department of Mathematics and Computer Science



My research has been concentrated in the selected areas of Fluid Dynamics and Bio- Mathematics, namely:

- (i) Flow through porous media
- (ii) Non-Newtonian fluid flows
- (iii) Magneto Hydrodynamic flows
- (iv) New methods to find the solutions of partial differential equations
- (v) Epidemic models
- (vi) Prey and Predator models

Flow through porous media

Flow in the porous medium has many applications in Civil Engineering, Chemical, Mechanical Engineering, Petroleum Engineering and Physiological flows.

In 1972 I became interested in coupled fluid flows in porous medium. The coupled fluid flows can be

described as simultaneous flow in an open space and in a porous medium. The flow in the open space (also known as clean region) is given by the Navier-Stokes equations and the flow in the porous medium is governed by the Darcy's law or the Brinkman equations with the interfacial conditions as continuity of normal velocity and pressure and slip conditions for the tangential velocity in the case of Darcy's law or the continuity of velocity and stresses at the interface in the case of Brinkman equations.

I have used both the models in my studies and did some classical problems e.g. flow between two discs with upper one rotating and lower one at rest made up a porous material of finite thickness, flow past a heterogeneous porous sphere, flow past a porous spherical shell using matched asymptotic technique.

It was discovered that by changing the porous material the velocity of the inner fluid could be increased or decreased. This idea can be used for removing gall stones/kidney stones once they are in the arteries.

Balswaroop Bhatt

Non-Newtonian fluid flows

The important application of coupled fluid flows was found during 1982-84 when I studied the movement of a large liquid bubble (micropolar fluid) surrounded by another liquid (Newtonian fluid) in a porous tube that resembles the flow of blood surrounded by plasma in an artery.

It was discovered that by changing the porous material the velocity of the inner fluid could be increased or decreased. This idea can be used for removing the gall stones/kidney stones once they are in the arteries. The same idea can be used for the movement of an ovum transport in an oviduct after fertilisation.

Magneto Hydrodynamic flows

Sometimes in oil well drilling we come across hard rocks which make the drilling impossible. In such situations acids (known as mud acids) are used to soften the rock. To get insight into such problems the study of stability of moving acid front in the porous rocks becomes very important since it may damage the structure.

John Hinch and I examined the conditions of stability for the movement of an acid in a porous medium. The heat transfer problems in porous media have been carried out by my first Ph. D. student who obtained her degree in (2007).

At present we are considering the Brinkman, Darcy combination to describe the porous medium as given by Hill and Straughan, Generalized Couette flow of two immiscible fluids has been examined by an M.Sc. student in his project. Another student is working towards his Ph. D. in this area.

New methods to find the solutions of partial differential equations

Two new techniques, namely, hodograph method and the group invariant

solutions have been used to find solutions of partial differential equations.

In the first method we interchange the role of dependent and independent variables in two dimensional motion and get new solutions of p.d.e. In the second we use the Lie group symmetry to generate all possible solutions of a p.d.e. (Bhatt and Krishnan).

My second Ph.D. student has studied symmetries of differential equations: topics in nonlocal symmetries of dynamical systems and was awarded his degree in 2010.

Epidemic models

Prey and Predator models

(v) and (vi) deal with the system of first order ordinary differential equations where we are mainly interested in the equilibrium values and the stability of the equilibrium values. In the existence of equilibrium values means the disease exists and the instability means the disease becomes epidemic. We try to find the ranges of various parameters (e.g. birth rate, death rate, transmission rate of disease etc.) under which the disease can be controlled.

In (vi) the instability means that the prey and predators can not coexist. These ideas can be applied to the study of:

- crime in a country,
- the trade between countries,
- the war between two countries,
- the management of any institution or company,
- any other system where we come across the interaction of two or more species.

We are using disease and prey predator models to study crime in Trinidad and Tobago (one of my Ph.D. students is working on this).

My future research will be on the applications of above areas.



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PUBLICATIONS

E. J. Hinch and B. S. Bhatt; Stability of an acid front moving through porous rock. J. Fluid Mech. 212 (1990) 279-288.

M. E. O'Neill and B. S. Bhatt; Slow motion of a sphere in the presence of a naturally permeable wall. Quart. Jour. Mech. Appl. Math. 44 (1991) 91-104.

Balswaroop Bhatt, David Owen and Rameshwar P. Jaju; Switching effect on prey species living in different habitats with arbitrary predatory rates II, J. phys. Soc. Japan 71,9 (2002)2304-2309.

B. S. Bhatt, D.R. Owen and R. P.Jaju, Switching of predation on prey species in the presence of predator interference. Int. J. Pure and Applied Mathematics 45,4(2008) 587- 598

Richard A.I. Brathwaite

Professor - Agronomy
Department of Food Production



I have developed two schools of research, one in Agronomy with emphasis on Cereals and Legumes, and the other in Weed Science. My research programme is concerned with the comparative evaluation of growth, development, yield and yield components of improved germplasm and the development of agronomic optima in Legumes (bodie bean, soyabean) Cereals (rice, maize, sorghum) and selected Horticultural Crops.

Research is also focused on aspects of Weed Science including studies on problem weeds like *Rottboellia cochinchinensis* (corn grass) and *Commelina spp.* (water grass) and the identification of efficacious chemical and non-chemical weed management systems in a range of cropping and non-cropping situations.

Work continues under these two schools with new areas of focus aimed at enhancing food and nutrition security, rural development and poverty alleviation. These are:

1. The utilisation of agricultural by-products (compost, compost teas and botanicals) for pest and disease control, as well as growing media.
2. Agronomic evaluation of heat and salt tolerant vegetable varieties in open field and under protective

structures.

3. Sustainable cropping systems for the production of vegetables under protective structures.

Major contributions arising from the research are: the development of the composite sweet corn variety "UW 7," which is a rugged performer producing two marketable ears per plant with excellent consumer acceptability; the identification of improved high yielding varieties well-adapted to our particular environmental and edaphic conditions and agronomic optima for the production of corn, cowpea, soyabean and selected vegetables; the identification of weed management strategies for a range of crops including Cereals, Legumes and selected vegetables.

Many of the studies on the crop species, especially the vegetables, have been conducted using on-farm research with cooperating farmers and this has resulted in their adoption of improved practices.

Most of the research work has been carried out in association with nine Ph.D, ten M.Phil. and five M.Sc. graduate students as well as in undergraduate student projects.

PUBLICATIONS

GANPAT, W.G., ISAAC, W.P., BRATHWAITE, R.A.I. and BEKELE, I. (2009). Farmers' attitude towards a participatory research method used to evaluate weed management strategies in bananas. *Journal of Agricultural Education and Extension*. 15 (3): 235 – 244

St. Martin, C.C.G., Bedasie, S., Ganpat, W.G., Orrigio, S., Isaac, W.A.I., and BRATHWAITE, R.A.I. (2008). Greenhouse Technology is once again washing the Caribbean. Can we ride the wave this time around? *Proceedings of the International Congress on Tropical Agriculture*, 30 November – 5 December 2008, Hyatt Regency Trinidad, Port of Spain. pp. 144-152.

BRIDGEMOHAN, P., BRATHWAITE, R.A.I. and MC. DAVID, C.R. (1991). Seed survival and patterns of seedling emergence studies of *Rottboellia cochinchinensis* (Lour.) W.D. Clayton in cultivated soils. *Weed Research* 31 (2): 265 - 272.

RAMKHELAWAN, E. and BRATHWAITE, R.A.I. (1990). Leaf area estimation by non-destructive methods in sour orange (*Citrus aurantium* L.). *Tropical Agriculture (Trinidad)* 67 (3): 203 - 206.

BRATHWAITE, C.W.D., POLLARD, G.V., ELANGO, F., HAQUE, S.Q., PERSAD, C.G., BALA, G., BRATHWAITE, R.A.I. and GRIFFITH, S.M. (1987). Guidelines for the identification and diagnosis of damage in crop plants caused by insects, diseases, weeds and nutrient disorders. Inter-American Institute for Cooperation on Agriculture (IICA), Trinidad and Tobago. ISSN-0253-4746



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Andrew Lawrence

Professor - Environmental Biology
Department of Life Sciences



Marine Sea Cucumber Study – importance of marine invertebrates

Shortly to be published in a book and supported by two prestigious Darwin Initiative grants, this nine-year study examined the over-exploitation and vital role of sea cucumber in the Egyptian Red Sea. Professor Lawrence was Project Leader in both studies, which involved a survey of the species in the region and those being exploited in the fishery, an examination of bioactive substances of potential medical use, development of a model aquaculture system for sea cucumber and study of the functional importance of this group of animals.

Survey highlighted significant over-exploitation of sea cucumber

Results from the survey identified 22 species of sea cucumber in the shallow waters of the Egyptian Red Sea. Of these seven species were exploited commercially. The survey also showed that the fishery in Egypt was following the boom and bust pattern of over-exploitation. Almost all commercial species were fished out along the whole coastline of Egypt with the most valuable species becoming locally extinct. The results were presented to the Egyptian Government who instigated a three-year ban on the fishery in the most affected Governorate.

Study identifies bioactive substances of potential use

A second aspect involved an intensive study to identify any bioactive properties in the key sea cucumbers collected in the region. Sea cucumbers are well known for their biomedical value in Asia particularly as an anti-inflammatory. Over 150 bioassays were undertaken



The survey team collects samples of each species of sea cucumber.

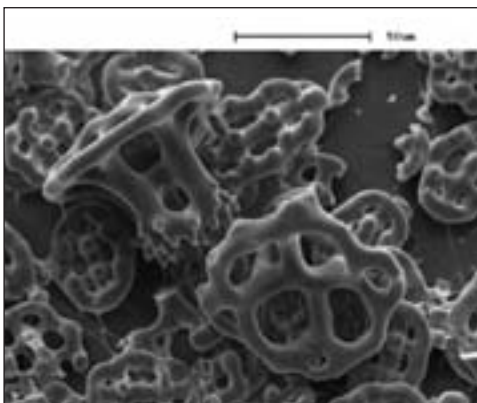
against bacteria, fungi, a protozoan parasite and two cancer cell lines. Whilst no antibacterial activity was found, we did find significant activity against three strains of the fungal infection *Candida*.

Our work also identified activity from several species against the protozoan parasite *Leishmania*. Fungal infections are increasingly important in hospitals particularly in patients with immune deficiency such as HIV. However, the activity against *Leishmania* may be even more important.

On the WHO list of most important pathogens, it is estimated that 350 million people are at risk of Leishmaniasis. There are over 12 million infected people worldwide with two million new cases each year. Of these, it is estimated that 57,000 people die each year. In addition, with links now to HIV infection, there



The survey team with Prof. Lawrence (second on left).



Clockwise from top
One of the species of sea cucumber from which bioactive substances of potential use have been identified.

Scanning EM of spicules from the skin of a sea cucumber, vital for the identification of each species.

Breeding and growing these valuable animals could lead to a sustainable fishery in Egypt.

may be a real potential to develop treatments against this disease.

Most recently we have also found biological activity against the cancer cell lines. Interestingly, the biological activity seems to vary between populations of the same species in different parts of its range. This has led to a re-examination of the taxonomy of the species using traditional taxonomy and DNA bar-coding techniques. This has shown that these populations are genetically isolated and may represent sibling species. This has important implications for the conservation and management of these species.

Functional importance of sea cucumber

In addition to these studies we also looked at why sea cucumber are so important and what their functional role in the ecosystem is. Closely related to starfish, these animals can grow to over one metre in length and we found that they are vitally important in nutrient recycling and in maintaining the health of coral reef ecosystems. As sediment feeders and nutrient recyclers the loss of these animals through over-fishing may lead to a significant degradation of the world's coral reefs.

Mariculture of sea cucumber

In the final aspect of the study we looked at whether mariculture could help to save this group and provide an alternative source of animals to fishing, thereby

maintaining the livelihoods of local fishing communities.

Overall, the project has been considered a great success. We have shown that the potential options value of the animals as suppliers of new drugs may be much higher than that currently gained directly through the fishery. This, together with the important functional role of the animals has been successfully used to encourage the Egyptian Government to maintain the existing ban on the fishery and to give the stocks time to recover.

As a consequence we were invited to participate in an UNFAO workshop in China reporting on sea cucumber trade and mariculture and a workshop in Malaysia to advise the Animals Committee of the Convention on International Trade in Endangered Species (CITES) on the possible listing of this group of animals.

Finally, it has also highlighted the importance of many species to the health of coral reef ecosystems. Coral reefs have been shown to be incredibly important to the economies of the countries of the Caribbean. For example, approximately 60 per cent of the GDP of Tobago is related to its coral reefs. Yet these systems are increasingly under threat.

We have just begun a study, therefore, looking at the resilience of the coral reefs in Tobago and the role of herbivorous fish in the maintenance of coral reef ecosystem health.



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PUBLICATIONS

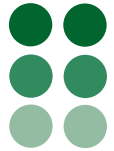
Lawrence, AJ and Hemmingway Eds: (2003) *The Effects of Pollution on Fish, Molecular Mechanisms to Population Responses*. Blackwell Science Ltd, Oxford, 336pp

Lawrence, A.J., Ahmed, M., Hanafy, M), Gabr, H., Ibrahim, A and Gab-Alla, A. (2004) Status of the Sea Cucumber Fishery in the Red Sea – The Egyptian Experience. In: Lovatelli, A. (comp./ed.); Conand, C.; Purcell, S.; Uthicke, S.; Hamel, J.-F.; Mercier, A. (eds.). *Advances in sea cucumber aquaculture and management*. FAO Fisheries Technical Paper. No. 463. Rome, FAO. 2004. 457p

Ahmed, M.I. and A. J. Lawrence (2007) *The Status of Commercial Sea Cucumbers from Egypt's northern Red Sea Coast*. Beche de Mer Information Bulletin 26, 14-18

Dyer Narinesingh

Professor - Chemistry
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Our research group's focus over the years has been centred around the attachment of biologically active molecules such as enzymes, antibodies or antigens to various types of polymeric supports with the view of utilising these immobilised biomolecules in the development of clinical as well as environmental biosensors, immunoassays, enzyme based clinical analyses, affinity chromatographic purification of antibodies as well as industrial bioreactors and implantable devices in humans.

To date we have been able to develop and evaluate a number of amperometric biosensors for monitoring clinically important substances such as glucose, urease and cholesterol. Here our focus has been on the trapping of the clinically important enzymes such as glucose oxidase, peroxidase and urease into a specially formulated electroactive biocompatible co-polymer consisting of poly-hema (the polymer used in contact lenses and breast implants) and polypyrrole.

To date the biosensors developed have been evaluated in vitro and have shown to have very low detection limits and relatively free of interferences from other substances inherently present in serum. These biosensors have also been reconfigured for use as potential implantable devices in experimental animals and are being evaluated.

The ultimate aim is to be able to use these biosensors as implantable devices in human beings for the continuous (24/7) monitoring of clinically important metabolites. This specially formulated electroactive biopolymer is also being evaluated for use as a potential "artificial pancreas" in the treatment of diabetes by trapping into the polymer both insulin and glucose oxidase. In vitro testing is currently in progress.

We have also been developing various environmental amperometric biosensors for the rapid monitoring of pesticides residues and heavy metals in food crops

and water samples. These sensors are based on the degree of enzyme inhibition by the analytes.

Another related aspect of our research focuses on the development of novel synthetic affinity matrices for the purification of antibodies. Antibodies are now being widely used commercially for diagnostic as well as therapeutic purposes. As such rapid, simplified, low cost methods of purification leading to high purity antibodies are critical in this context.

Our research group has successfully developed a novel synthetic biochromatographic affinity matrix for the rapid purification of immunoglobulins. The affinity matrix was synthesized by coupling *N,N*-dimethyl aminopyridine and analogues of 2-, 4-, 6-trihalopyridine and the procedure involves a simple two-step purification procedure.

The third aspect of our research focuses on the use of immobilized biomolecules, mainly enzymes and antibodies coupled with flow injection analysis to develop improved analytical systems for the quantitations of important clinical metabolites. These methods of analyses seek to combine the specificity and sensitivity of these biomolecules, the advantages of immobilisation and the sensitivity, small sample volumes and high throughput rate of flow injection into a single analytical procedure.

A number of analytical procedures have been developed using this technique for the quantification of clinical samples such as glucose, urea and cholesterol. Of special interest is the development of an elisa screening method for the quantification of a pan-tumor marker associated with cervical and lung cancers. Work has also been done on the use of immobilised enzymes in industrial reactors. Two such applications that have been successfully evaluated were the use of immobilised lactase and papain in the removal of lactose from milk and the clarification of beer.



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PUBLICATIONS

D.F. Wu, X. Zhou, G. Anderson, A. Fuentes, L. Slater, D. Narinesingh, P. Jiminez, T. Gopiesingh and T.T. Ngo, (1999) Sensitivity and Specificity of DR-70TM Lung Cancer Immunoassay. *Analytical Letters* 32(7), 1351-1362.

S. Brahim, D. Narinesingh and A. Guiseppi-Ellie (2002) Polypyrrole-hydrogel composites for the construction of clinically important biosensors. *Biosensors and Bioelectronics*, 17(1-2), 53-59.

S. Brahim, D. Narinesingh, A. Guiseppi-Ellie (2002) Bioactive composite hydrogels for clinical biosensors and Controlled release of drugs *Polymer Preprints*, 43(2), 625-62

Christian Posthoff

Professor

Department of Mathematics and Computer Science



In the area of research, I want to emphasise some different properties and directions:

- the research must be comparable with the advanced international level,
- the research must be useful in the environment of the researcher,
- the research must include students and contribute to their education,
- the research must have a broad educational background.

The research can be grouped in the following way: The first group includes the interdisciplinary research shared by **Mathematics - Physics - Computer Science - Medicine** that has been based on the cooperation of Prof. Saunders, Prof. Addae and myself. Some example include:

Krauss, M., Grohmann, G., Addae, J., Posthoff, C., Saunders, R. Non- invasive recording of parameters of the heart and the circulatory system using the NIRP-method and its application for the sickle cell anaemia Monograph (48 pages), 2002.

M. Krauss, C. Posthoff, D. Bilz Optimal and Normal Values for Heart and Circulatory Parameters and their Assessment by Non-invasive NIRP Methods Signal and Image Processing (SIP-96), Orlando 1996.

Arjoon, C., Addae, J., Saunders, R., Posthoff, Ch., Krauss, M. et al. Analysis of the Cardiovascular and Autonomic Nervous Systems in Normals and Patients Using Photoplethysmography, IX. Annual Meeting of the Caribbean Academy of Science, Guadeloupe, 1998.

Ramadharsingh, R., Saunders, R., Posthoff, C. et al. SQUID magneto- cardiography in healthy Trinidadians, Proceedings of XXI Congress of the European Society of Cardiology. 1999, pp. 991-994.

Saunders, R., Peters, H., Addae, J., Posthoff, Ch. et al. Coarse-grained dimensional analysis of EEG waves in healthy and patients with functional disorders, 12th Annual Meeting and Conference of the Caribbean Academy of Sciences, Guyana, 2001.

The second group includes research results that are applied in **Artificial Intelligence and in Electrical Engineering (Logic or Digital Design)**.

Posthoff, Ch. Learning fuzzy-logical structures from



examples Workshop on Advances in Methodology and Software in Decision Support Systems, International Institute for Applied Systems Analysis, Laxenburg, Austria, 1995, Proc. p. 34.

Posthoff, Ch. Prototyping of Learned (Fuzzy) Logic Structures Using (Fuzzy) Logic Equations 2nd Workshop Boolesche Probleme, TU Bergakademie Freiberg, 1996, Proc. p. 79-84.

Posthoff, C. Learning Logic Functions from Examples - Better conceptions and Models Proceedings Intelligent Information Systems IIS'97, Bahamas 1997, p. 251-256.

Posthoff, C. Learning from Examples and Decision Trees IX. Annual Meeting of the Caribbean Academy of Science, Guadeloupe, 1998.

Steinbach, B.; Posthoff, Chr. Optimal Design Using Implicitly Given Function Sets In: The Experience of Designing and Application of CAD Systems in Microelectronics - Proceedings of the VII-th International Conference CADSM. Lviv Slavsko, Ukraine, 2003, pp. 446-453.

Steinbach, B.; Posthoff, Chr. Optimal Design by Resolving Boolean Equations In: The Experience of Designing and Application of CAD Systems in Microelectronics - Proceedings of the VII-th International Con-

ference CADSM. Lviv Slavsko, Ukraine, 2003, pp. 454-457.

M. Johnson, Ch. Posthoff, TRISAT - A SAT-solver Using Ternary-Valued Logics 14th International Workshop on Post-Binary ULSI Systems, University of Calgary, May 18, 2005.

Ch. Posthoff, M. Steinbach A Multi-Processor Approach to SAT-problems 9th International workshop on Boolean Problems, Freiberg University of Mining and Technology, Freiberg, Germany, 2006.

Steinbach, B.; Posthoff, Ch. Extended Theory of Boolean Normal Forms In: Proceedings of the 6th Annual Hawaii International Conference on Statistics, Mathematics and Related Fields, Honolulu, Hawaii, 2007, pp. 1124-1139.

Posthoff, Ch.; Steinbach, B. SAT-Problems - New Findings In: Proceedings of the 6th WSEAS International Conference on Data Networks, Communications, Computers, Trinidad and Tobago, , 2007, pp. 339-344.

Posthoff, Ch.; Steinbach, B. The Solution of Combinatorial Problems Using SAT In: SIAM Conference on Discrete Mathematics - Abstracts, 16 19 Juni 2008, Burlington (Vermont), USA, p. 36.

Posthoff, Ch.; Steinbach, B. Sudoku Solutions Using Logic Equations In: Steinbach, B. (Hrsg.): Proceedings of the 8th International Workshops on Boolean Problems, Freiberg University of Mining and Technology, Freiberg, 2008, pp. 49-57.

Steinbach, B; Posthoff, Ch. The Boolean Differential Calculus - Introduction and Examples Proceedings Reed-Muller Workshop, Naha, Okinawa, Japan, 2009, pp. 107-117.

Steinbach, B.; Posthoff, Ch. Complete

Sets of Hamiltonian Circuits for Classification of Documents In: Quesada-Arencibia, A.; Rodriguez, J.C.; Moreno- Diaz, R. jr.; Moreno-Diaz, R. (Eds.): EUROCAST Computer Aided System Theory, Extended Abstracts. IUCTC Universidad de Las Palmas de Grand Canaria, 2009. pp.177-178.

The final area is **Education-related activities**. The relation between research and education is one of the most important factors to be considered. Particularly, the two books published in 2004 and 2009 show the relation between research and education.

First, you must explore the theoretical problems and solutions, and then these results must be supported by software and introduced into the education of engineers and Computer Scientists.

Steinbach, B.; Posthoff, Ch. Logic Functions and Equations Examples and Exercises Springer Science + Business Media B.V., 2009, pp. 1-231.

Ch. Posthoff, Artificial Intelligence - State and Application Fifth Annual Meeting of The Academy of Sciences, Georgetown, Guyana 1994.

Ch. Posthoff, Computer Science Education - Present Stage and Further Requirements Sixth Annual Meeting of The Academy of Sciences, Castries, St. Lucia 1995.

Ch. Posthoff, The Impact of Information Technologies on Science, Technology and Education Proceedings of The Caribbean Academy of Sciences, 7th Annual General Meeting, 1996, p. 121-126.

Ch. Posthoff, Computer Science as one Foundation of (Higher) Education Conference "Re-Thinking Education in the Caribbean: Yesterday, Today and Tomorrow", Sint Maarten, October 11-13, 2006.



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PUBLICATIONS

Steinbach, B.; Postho, Ch. XBOOLE and the Education of Engineers In: Computer-Aided Design of Discrete Devices - CAD DD 2007, Proceedings of the Sixth International Conference , 2007, Minsk, Belarus, Volume 2, pp. 14-22.

Steinbach, B.; Posthoff, Ch. Set-Based SAT-Solving. In: Journal - FACTA UNIVERSITATIS (NI), Series.: Electronics and Energetics. Vol. 20, No. 3, 2007, 395-414.

Posthoff, Ch.; Steinbach, B. Logic Functions and Equations Springer Science + Business Media, 2004.

Indar Ramnarine

Professor - Fisheries and Aquaculture

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I have been involved in Aquaculture Research, Fisheries Research and Fish and Shellfish Diversity (both freshwater and marine) since 1985 when I returned to Trinidad and Tobago to join the Department of Zoology, UWI. Within the past ten years I have developed research interests in evolutionary biology and behavioural ecology of the guppy. I have successfully supervised seven PhDs and seven M.Phils pursuing higher degrees in the field of fisheries science and management, aquaculture and fish and shellfish diversity, and behavioural ecology of the guppy. I am currently supervising two PhD and five M.Phil students.

My research has yielded one book, one monograph, one book chapter, 48 publications in refereed journals, 16 refereed conference proceedings, 13 refereed abstracts, 18 workshop papers and ten technical reports. I have published ten papers in 2009 and 2010 since attaining the rank of professor.

Aquaculture Research

My research in aquaculture has focused on studies on induction of spawning, determination of the nutritional requirements, and development of hatchery and production technology for important local species with potential for aquaculture. I developed methods for induced spawning in the cascudu and river conch, determined the nutritional requirements of both species and also the production technology for the commercial culture of both species.

I also worked on the hatchery and production technology for the Malaysian prawn and have improved methods for the intensive culture of the tilapia. I designed hatcheries and fish farms in Trinidad, Guyana, Bangladesh and Nepal and have done voluntary work in Jamaica, Guyana, Suriname, Cambodia, Nepal, Thailand and Bangladesh.

My current research in aquaculture involves the development of Urban Aquaculture using the tilapia as the major species. I have also begun research on the development of Aquaponics with the intention of screening local plants and fish species for culture and eventually developing backyard systems. I chaired a committee that formulated a Policy for Aquaculture Development for the MALMR, served as Chairman of the Aquaculture Association of Trinidad and Tobago and am currently the technical advisor to this association. I have attended international aquaculture conferences and have chaired various sessions at these meetings.

Fisheries Research

My research on Fisheries has focused on the development of sustainable fishing methods and I have worked

closely with the Fisheries Division of the MALMR. With post-graduate students, we have determined the optimal mesh size for the fish pot fishery of Trinidad, the optimal mesh size for the carite and mullet gillnet fishery and also evaluated the fish nursery function of the Caroni Swamp. I am currently working with a post-graduate student on the development of a by-catch model for the shrimp trawl fishery in the Gulf of Paria.

I served on the Fisheries Monitoring and Advisory Committee of the MALMR as Deputy Chairman, as well as on the National Wetlands Committee. I also lead a UWI Team that developed a Policy for the Management of Marine Fisheries of Trinidad and Tobago.

A few years ago, I developed a plan for the management of the fisheries resources in the Caroni Swamp.

Fish and Crustacean Diversity Research

I have conducted surveys in both islands of Trinidad and Tobago to look at the diversity of fish and decapod crustaceans and have co-supervised two graduate students who studied the diversity of these groups. I have also developed a key for the identification of the freshwater fish of Trinidad and Tobago. I conducted a study on the aquatic biodiversity of the Caroni Swamp with emphasis on the fish and shellfish diversity. I am currently part of a research team led by Professor A. Magurran of St Andrew's University, which was awarded a European Research Council Grant for the sum of 1.8 million euros for the project entitled "Biological diversity in an inconstant world: temporal turnover in modified ecosystems". This is a five-year project that is due to begin in September 2010 and would involve research in freshwater ecosystems in Mexico, the Amazon, Scotland and Trinidad.

Guppy Research

I am actively involved in guppy research from the evolutionary biology and behavioural aspects and have established collaborative links with researchers from Scotland, Canada, USA, Wales, England, Sweden, Italy and Australia. Our research looks at networking, sexual harassment, sperm competition, mate discrimination, response to alarm cues amongst other behavioural aspects.

Expertise

I am considered to be one of the regional experts in aquaculture and fisheries and a world authority on the Cascadu (Hassar) and designed several aquaculture projects in various countries with emphasis on tilapia and prawn culture.



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PUBLICATIONS

Ramnarine, I.W. (1994) Larval development and growth of the cascadu *Hoplosternum littorale* (Hancock 1828). *Aquaculture* 126: 291 - 298.

Pettersson, L.B., Ramnarine, I.W., Becher, S.A., Mahabir, R, and Magurran, A.E. (2004) Sex ratio dynamics and fluctuating selection pressures in natural populations of Trinidadian guppies *Poecilia reticulata*. *Behavioural Ecology and Sociobiology*. 55: 461 – 468

Solomon, F.N. and Ramnarine, I.W. (2007) Reproductive biology of the white mullet, *Mugil curema*, in the Southern Caribbean. *Fisheries Research* 88(1-3): 133-138

Dr. Ashok Sahai

Professor - Statistics

Department of Mathematics and Computer Science



Research assessment as demonstrated through publications achieved with colleagues in the Department of Mathematics and Computer Science at UWI St. Augustine during the period 2006-2008 including web links for publications:

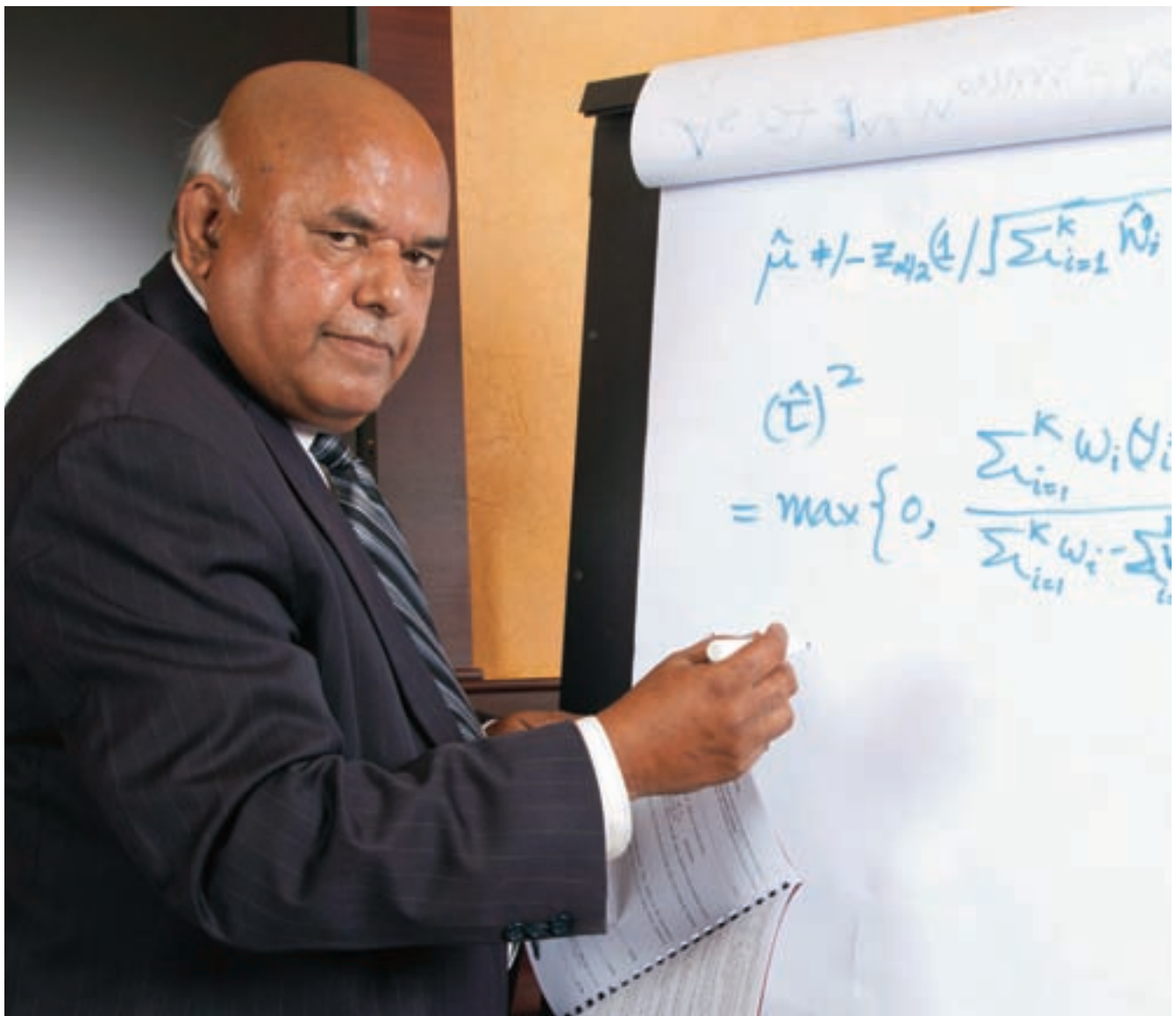
1. Acharya, M. Raghunadh & Ali, Hydar/2006/Jr. of Applied Sciences/6(9)/1966-68/ Efficient Estimation of Normal Population Mean/ <http://ansijournals.com/jas/2006/1966-1968.pdf>

2. Angela Shirley and M. Raghunadh Acharya/ 2006/ Jr. of Applied Sciences/6(9)/1797-97/Statistical-Oriented Iterative Algorithm for Improved Approximation by Modified Baskakov Operators/ <http://ansijournals.com/jas/2006/1794-1797.pdf>

3. Angela Shirley and M. Raghunadh Acharya/ 2006/Jr. of Applied Sciences/6(9)/1798-1801/ Statistically Improved Approximation by Modified Lupas Operators/ <http://ansijournals.com/jas/2006/1798-1801.pdf>

4. Shanaz A. Wahid & Arvind Sinha/2006/ Jr. of Applied Sciences/6(12)/ 2662-2665/A Positive Linear Operator Using Probabilistic Approach /<http://ansijournals.com/jas/2006/2662-2665.pdf>

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PUBLICATIONS

Richards, Winston A., Robin Antoine, *Ashok Sahai, and M. Raghunadh Acharya; "On Efficient Iterative Estimation Algorithm Using Sample Counterpart of the Searles' Normal Mean Estimator with Unknown Coefficient of Variation"; InterStat.<http://interstat.statjournals.net/YEAR/2010/articles/1001007.pdf>

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To assist with visual problems identified in early days of the space flight program visual thresholds were measured for spots two minutes in diameter across the human retina. Eigenvectors of the light threshold variations across the human retina were determined. This work confirmed the validity of the use of eigenvector analysis for biological systems. See Saunders, R. McD. (1973). Eigenvectors of the Sensitivity Variations across the Human Central Fovea, Vis. Res. 13, 1823.

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Electrical recordings from single neurons in optic tract, lateral geniculate and cortex of the cat and optic tectum of the frog were carried out and analysed in order to determine the manner in which the brain processes colour information. (See Saunders R. McD. and Grusser-Cornehls U. 1981). Chromatic subclasses of Frog's Retinal Ganglion Cells: Studies Using Black Stimuli moving on a Monochromatic Background. Vis. Res. 21, 469.

University of the West Indies

Hysteresis in wood

Hysteresis effects in the expansion /relative humidity were discovered for the longitudinal, radial and tangential directions in local timber. This anisotropy can produce

defects that can significantly reduce the economic value of timber. Dimensional stabilisation to minimise hysteresis effects was achieved by heating and by multiple cycling of the hysteresis loop.

Utilising waste from the steel mill

1). Solar timber dryer : Using funding from the European Union (Lome II) a semi-commercial timber dryer was built in which slag from the local steel mill was used both as a heat absorber as well as for heat storage. This solar drying kiln is now available for commercial use to the benefit of the university. The EU inspectors described this project as "a good example of EU money well spent"

2). Production of lead pencils using waste graphite from the steel mill, local kaolinitic clays and local timber. This project was very successful but was not exploited because of competition of cheap products from the Far East.

3). Type 2 grease lubricants: High quality Type 2 grease lubricants were developed using specially processed graphite based on particle size. A local patent was obtained. Extensive test marketing was carried out for both industrial and automobile use. Success was achieved in both areas. The product was used by Caroni 1975 Ltd. for a period of two years, beating the competition of large multinational lubricant companies. The University is currently trying to commercialise this work

4). Battery production: We successfully produced,

funded by Trinidad Cement Limited, graphite brushes for motors and fabricated graphite lubricant blocks for the cement company in an emergency situation.

Photoplethysmography

This involves the use of special sensors on the finger to determine the blood volume pulsations the analysis of which can yield the vascular resistance in various parts of the body. From the analysis because of the chaotic nature of the vascular system we can determine the quality of the circulatory system in the arms, legs, and the heart itself. Combined with external stimuli we can determine the presence of a peripheral neuropathy. We have also combined this technology with magnetic mats that contain coils producing magnetic fields of various frequencies for the treatment of blood flow problems in the legs of diabetic patients. This work involved collaboration between Physics, the Medical Faculty and Computer Science and has been funded by the UWI/IDB Development Program.

Magnetocardiography

Here we have used a superconducting quantum interference device (SQUID) together with gradiometers to measure the magnetic field of the heart during the heart cycle or the Magnetocardiogram (MCG). This device is far more effective than the electrocardiograph (ECG) in evaluating problems with the heart. This work resulted from a collaboration between the University of Wales (Swansea) and the Physics Department UWI and was funded by the UWI/IDB Development Program.

The EEG is the record of the electrical signals of the brain and is usually measured using surface electrodes on the scalp. The signals are classified on the basis of the spectral frequency band in which they lie. Thus we have the alpha, beta, delta and theta bands representing different frequency spectra for analysis. Using a 22 electrode system we have a neurometric

system developed by New York University to produce brain maps for the different spectral regions for normals as well as people with brain dysfunctions resulting from schizophrenia, depression, autism and alcoholism. The UWI/IDB Development Program has funded this project.

Alzheimer's Disease

Cardio-cerebro vascular plaques formation responsible for Alzheimer's disease as well as plaquing in the blood circulatory system is currently being investigated with a group at the Charite (Free University and Humboldt University) in Berlin, Germany under Professor Günter Siegel and Professor Martin Malmsten at the Institute for Surface Science in Uppsala in Sweden.

In 2005 we produced the first in vitro nanoplaques for Alzheimer's disease with the lipoproteins Beta amyloid and Apo Lipoprotein E4 demonstrating clearly the genetic correlates of Alzheimer's disease and the development of appropriate strategies to eliminate nanoplaque formation.

Water Purification

Over a billion people in the world do not have a supply of safe drinking water. On account of diarrhea resulting from fecal coliform bacteria there are about 2.5 million deaths annually, of which 1.5 million are from children under five years of age. To assist in this problem we have been involved in a major project with five Latin American countries—Argentina, Chile, Mexico, Brazil and Peru—which was initially funded by the OAS. We have shown that under conditions in Trinidad and Tobago all fecal coliform bacteria are removed after four hours and with the use of simple solar concentration in two hours making the water safe for drinking. This method of disinfecting water is useful not only for rural areas but also in post disaster situations. Our research group has not only changed the technology but in addition have been able to obtain pure water in times as little as ten minutes.



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PUBLICATIONS

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Paul Shaw

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Department of Food Production



My research is in the fields of geomorphology and environmental change in the Tropics, ranging from rainforest to desert. Much of it focuses on the use of landforms as environmental proxies to reconstruct the past on a range of time scales, ranging from the late Quaternary (200,000 years) to the Historical (200 years).

I have worked extensively in deserts (in particular the Kalahari of southern Africa), in Eastern Europe, and in the Caribbean, with an output of two books and around 80 scientific papers.

Quaternary Science is the extraction of climatic or environmental information from the environment on timescales ranging from the historical (decades and centuries) to near-geological (10-1000 ka). It is reliant on the identification of climatic proxies—features that can be identified as potentially yielding climatic data, and the use of techniques to both interpret and date the proxy. It is a well-established and fast moving field, with long-term (1-100 ka) global records created from

proxies such as oxygen isotopes from 'big' science projects such as marine and ice cores.

Terrestrial records from the Tropics have been much harder to come by, firstly because of the poor preservation of sedimentary (especially organic) sequences on land, second because of the late development of appropriate chronological methods. These issues are particularly acute in the humid tropics and in deserts.

In the Kalahari region of Southern Africa my studies over the past 30 years of lakes, valleys, dunes, caves, chemical sediments and the Okavango Delta hydrological system have shown their potential as climatic proxies (see Thomas and Shaw 1990), whilst the development of new techniques, such as dating by optically stimulated luminescence (OSL) have pushed back the research frontiers in chronological control and resolution.

Recent work has focused on the dating of lake shorelines at Lakes Ngami (Botswana) and Chilwa (Malawi) using a specially designed corer to extract



The Caribbean offers less potential for palaeoclimatic study. However, landforms such as the caves of Trinidad offer clues to the response of the Caribbean to the same global climatic perturbations.

Paul Shaw

light-proof samples for OSL dating. These 200,000-year records (Burrough et al 2007; Thomas et al 2009), matched with other data sites in southern Africa, suggest that the region is not only prone to global climatic perturbations, but may lead, rather than follow, global responses.

Over the last glacial cycle southern Africa experienced aridity at the Last Glacial Maximum, followed by increased rainfall around 16-13,000 years ago. It is also apparent that the region's lakes are responding to relatively short-term events, such as Heinrich Events, which occur when the ocean circulation breaks down.

An offshoot of this research has been the development of new, high resolution, analytical techniques, particularly for cave speleothems. Mass spectrometry, using the latest generation of Secondary Ionising Mass Spectrometry (SIMS) equipment has allowed the analysis of stalagmite carbonate for trace elements, such as strontium and barium, at levels of one ppm over analytical spots of ten microns.

Mapping materials at this scale allows for the identification and characterisation of stalagmite precipitation at an annual to sub-annual scale, in turn yielding very high resolution climate records. An example of this is the 50-year precipitation record constructed from Ba:Ca and Sr:Ca

ratios for Cold Air Cave, South Africa (Finch et al 2003), a first step on the road to reconstructing annual temperature and rainfall records from cave deposits for the tropical world.

The Caribbean offers less potential for palaeoclimatic study. However, landforms such as the caves of Trinidad offer clues to the response of the Caribbean to the same global climatic perturbations.

To explore this possibility, it has been necessary to build a data base of all of the caves and their scientific potential, a task which has taken three years of fieldwork. Oxygen and carbon isotope analysis is now in progress on stalagmite G2U from Gasparee Cave, which offers an exciting insight into the climate of the island at 8,200 years ago, the time of the so-called 8.2k event, when disruption of the Gulf Stream circulation lowered the temperature of Europe by around 5°C and brought widespread drought to the Caribbean.

In the case of Trinidad, the period of aridity lasted around 30 years, way beyond the drought envelope of historical meteorological records. Given the intensity of the drought experienced in 2010 it is a useful reminder of the range of changes possible in our climatically uncertain present.



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Thomas, D.S.G., Bailey, R.M., Shaw, P.A., Durcan, J.A. & Singarayer, J.S. 2009 Late Quaternary highstands at Lake Chilwa, Malawi: frequency, timing and possible forcing mechanisms in the last 44ka. *Quaternary Science Reviews* 28:526-539

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Extracting speleothem G2 from Gasparee Cave, Trinidad.

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My research encompasses a number of areas of organic chemistry. These are generally targeted at obtaining solutions to a range of diseases that are prevalent in humans and to date have no general treatments. The approach my team are employing entails the attainment of a sound understanding of the mechanisms involved that are the cause of the disease states. I am also interested in developing new methods that solve significant problems in the energy sector and in Green chemistry.

Synthesis of cell surface epitopes of *Tuberculosis mycobacterium*

My research team members are engaged in developing new methodology for the synthesis of galacto- and arabinofuranoside (**1**, **2**), synthesis targeted at the synthesis of naturally occurring oligosaccharide found on the cell surface of the TB organisms. Our strategy involves synthesis of 1-*O*-unprotected sugars for use as glycosyl acceptors in the preparation of 1,5-linked oligofuranosides having free anomeric centres. While this approach could potentially lead to the formation of several glycosylation products, if successful, it would dramatically simplify the synthesis of oligofuranosides and possibly have general application in glycosylation. See Fig 1

The team has been partially successful in this strategy in that we have prepared arabinosaccharides in 35-40 per cent yields with total β -selectivity. As a result of these findings we have undertaken density functional theory calculations in order to understand the equilibria that occur and are involved in these reactions. See Fig 2

At present, we are actively investigating applying this approach for the synthesis of furanosides of the ribo- and xylo-sugars.

Carbohydrate Ionic Liquids.

My research team members and I have recently patented, (2008 Ionic Liquids, USA Patent: 12/126, 639), our research in the area of carbohydrate based ionic liquids. The synthesis of these new classes of ionic liquids is outlined in the scheme below. We are actively pursuing the utilisation of these stable ionic liquids for the enantiomeric synthesis of secondary and tertiary alcohols. See Fig 3

Supported Enzymes for Oligosaccharide Synthesis

In order to develop more efficient synthesis of complex oligosaccharides we have successfully immobilised transferase enzymes and are investigating their employment for the efficient synthesis of saccharides

Fig 1

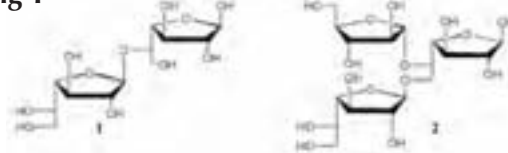


Fig 2

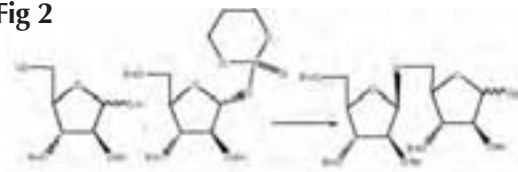
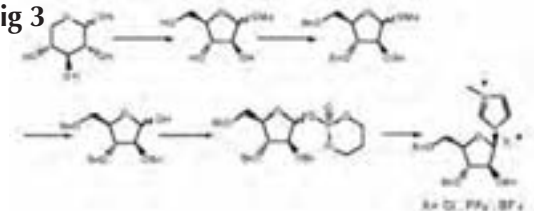


Fig 3



utilising both unprotected and partially protected sugars. We have observed that we obtain rate enhancement of glycosylation reactions using these supported enzymes along with good chemical yields. Our target is the synthesis of the important hexasaccharide, Globo-H. This antigen occurs on prostate cancer cells and can serve as a target for immune recognition.

Our strategy will substantially shorten the synthesis of this important saccharide. To date we have prepared the three disaccharides in 100 mg quantities required as part of the convergent synthesis for this target.

Synthesis of Glycosylcyanohydrins as Insect Antifeedants

A distinctive group of natural products found in higher plants, e.g. yams and cassava, that exhibit a definite relationship to their biosynthetic precursors are the cyanogenic glycosides. A characteristic feature of the cyanogenic glycosides, e.g. zierin **1**, is their ability to release hydrocyanic acid by hydrolysis and this process is often initiated by enzymes when the tissues which contain them are damaged by mechanical or other means.

The penultimate step in the biosynthetic pathway involves transglycosylation with UDPG.

Development of Novel Treatments for Dengue Viruses

The dengue virus is the most important human pathogen that is borne by arthropods. Over the last

decade the incidence of epidemics, as a result of contracting dengue fever, is estimated at up to 100 million cases annually. Furthermore, the most severe form of the disease, dengue hemorrhagic fever (DHF) has emerged in the same period resulting in 500,000 cases worldwide. Every year these infections result in death in ca. 33 per cent of the reported cases.

To date the sole method available to prevent dengue infections is the control of *Aedes aegypti*, the mosquito vector. This approach has proved to be expensive and mostly unworkable with serial infections occurring in most of the tropical regions of the world where multiple dengue viruses circulate.

In order to investigate the efficacy of new vaccines we are involved in the synthesis of the saccharide GlcNAc-[Fuc(a1-6)]-b1-4GlcNAc-Manb1-4(Mana1-6)a1-3Man using 1,3-propanediylphosphate coupling protocols.

Peptides; Oxidation of Methane

The efficient transformation of methane to methanol is chemically a difficult reaction

to perform due to the C-H bond strength being 435 kJmol^{-1} , making it the most inert hydrocarbon. Furthermore, the conditions required for its conversion to the desired product, methanol, and results in the latter undergoing additional chemical reactions. To our knowledge catalysts to overcome these problems remain elusive. In stark contrast to this, methane monooxygenase enzymes, in nature, convert methane to methanol at room temperature. The crystal structure of membrane-bound particulate methane oxygenase has been reported recently. The active site of the enzyme contains Cu (II) ions.

Our programme is utilising a fragment based approach to prepare the peptide SAIGLLSAVAATAFYAAHGE and to study its binding to copper and subsequent oxidation.

An added benefit derived from this programme is that it will provide in house skills and methodology for the synthesis of peptides and thus provide expertise for the synthesis of complex glycopeptides, accomplishing a long term goal in my research.



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Pathmanathan Umaharan

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Head, Cocoa Research Unit



Professor Umaharan's research efforts have been focused on genetically improving yield, product quality and resistance to tropical diseases with the ultimate goal of improving the profitability of tropical crops grown in the Caribbean. Genetic strategies provide for a sustainable approach to improving agricultural productivity.

Resistance to diseases

Tropical pests and diseases severely affect crop productivity in the Caribbean; and estimated losses in productivity due to diseases vary between 20-80 per cent. Much of the work of Prof. Umaharan and his graduate students have focused around developing resistance to diseases affecting tropical crops with the ultimate goal of improving profitability, and includes: (a) charactering the causal organisms (b) developing screening methods to the diseases (c) identifying sources of resistance (d) studying the genetics of resistance and (e) developing marker-assisted selection approaches or candidate gene based approaches to identify resistance, when required and (e) breeding new varieties utilising the sources of resistance identified.

Highlights of the work on tomato include (a) elucidation of Potato yellow mosaic (b) developing diagnostic methods for the detection of the virus, (c) study of the epidemiology of the virus (d) identification of resistance to the virus and (e) field evaluation of varieties that combine acceptable levels of resistance with good agronomical characteristics for release to farmers. In addition, screening methods for identifying resistance to bacterial wilt (*Ralstonia solanacearum*) were developed, which have been used to identify resistance and to understand the genetics of resistance. Using the screening methods a number of varieties that combine resistance to both diseases have been selected for release to the farmers. Work is now being undertaken to incorporate nematode resistance based on candidate gene markers.

Highlight of the work on black-eyed pea and bodi (*Vigna unguiculata* L. Walp) include the breeding of varieties that combine resistance to Cowpea severe mosaic virus (CPSMV) and *Cercospora* leaf spot diseases. This involved the (a) elucidation of the existence of CPSMV and two species (*Pseudocercospora cruenta* and *Cercospora apii* pseudonym *cruenta*) of the causal organism of *Cercospora* leaf spot disease; (b) an epidemiological study to determine the prevalence and incidence of the diseases in Trinidad and Tobago; (c) characterising the effect of the diseases on crop productivity (d) identification of resistance to the pathogens (e) elucidation of the genetics of resistance to the pathogens and (f) breeding bodi and black-eyed pea varieties that combine resistance to both CPSMV

and *Cercospora* leaf spot diseases with high yield.

The focus on work carried out in *Anthurium* has been on resistance to two bacterial pathogens, bacterial leaf blight, caused by *Xanthomonas axonopodis* pv *dieffenbachiae* and bacterial leaf spot caused by *Acidovorax anthurii*, which together with the nematode, *Radopholus similis* were responsible for the decline of the *anthurium* industry in the Caribbean and in other parts of the world. At present, work on nematode resistance is underway with the objective of transferring resistance identified in local Caribbean pinks into elite varieties.

Work on cocoa (*Theobroma cacao* L) has centred around two major diseases affecting cocoa production, black pod (*Phytophthora palmivora*) and witches' broom (*Moniliophthora perniciosa*) diseases, the first is of global importance, while the latter is of importance in Latin



NEW VARIETIES *have been developed and released to farmers.*

- Three dwarf photoperiod insensitive pigeon-pea varieties (UW223. UW263; UW255).
 - Three bodi varieties, UW-Resist, UW22 and UW27 that combine resistance to Cowpea severe mosaic virus disease and Cercospora diseases.
 - Two black-eyed-pea varieties that combine resistance to Cowpea severe mosaic virus disease and Cercospora diseases.
 - Five Anthurium varieties that combine resistance to bacterial blight with bacterial leaf spot resistance are being evaluated for release.
 - Tomato varieties with high levels of resistance to begomoviruses and good agronomic features have also been identified for release to farmers.
-

America and the Caribbean. At present, the methodologies are used in pre-breeding programmes to develop resistance enhanced populations and in breeding to develop better cocoa clones.

Research on disease resistance in hot-pepper is presently underway with studies directed towards developing resistance to viral diseases and *Phytophthora capsici*. Studies are underway on *Phytophthora* resistance.

Improvement in yield and product quality

Prof. Umaharan's work has also centered on improving yield and product quality in bodi beans, pigeon pea and hot pepper and product quality in cocoa and Anthurium. Studies on improving yield entailed determining the relative contribution of yield components to yield, understanding the genetics of yield components, investigations into heterosis and the exploitation of heterosis in breeding and developing breeding strategies to effectively improve yield through breeding. Studies on product quality involved studying factors affecting consumer acceptance, developing methodologies to assess quality parameters, investigating the genetics of product quality attributes and developing appropriate breeding approaches.

Outreach

a) New varieties have been developed and released to farmers to overcome constraints.

- Three dwarf photoperiod insensitive pigeon pea varieties (UW223. UW263; UW255)
- Three bodi varieties, UW-Resist, UW22 and UW27 that combine resistance to Cowpea severe mosaic virus disease and Cercospora diseases
- Two black-eyed pea varieties that combine resistance to Cowpea severe mosaic virus disease and Cercospora

diseases

- Five anthurium varieties that combine resistance to bacterial blight
- Tomato varieties with high levels of resistance to begomoviruses and good agronomic features

b) Patents and variety protection certificates:

- A patent for the identification of systemic resistance to bacterial blight using a gfp based plasmid and resistance to foliar infection using a leaf vacuum infiltration method has been obtained.
- Variety protection certificates are being applied for the black-eyed pea varieties, bodi varieties, pigeon pea varieties and anthurium varieties.

c) Incubators

- UWI has engaged in research and development activities with Kairi Blooms Ltd in a incubator-type setting. In particular breeding of new varieties is being pursued using technologies developed by UWI.
- A semi-commercial tissue culture facility has been set up to provide anthurium plantlets to local growers who need anthurium propagules in small numbers.

d) Commercialisation arrangements

- The bodi, black-eyed pea and pigeon pea varieties are being tested on a large scale at the Chaguramas megafarm. Similarly, the anthurium varieties are being tested at Kairi blooms limited on a large scale.
- A memorandum of understanding has been developed with Trinidad and Tobago Agribusiness Association for the commercialisation of new hot pepper hybrids being developed.
- Licensing arrangements for the commercialisation of bodi, black-eyed pea and pigeon pea is being pursued with private seed companies.



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Kit Fai Pun
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Research 2000-2010

The Faculty of Engineering, a leading single campus faculty of The University of the West Indies, is dedicated to the conduct of fundamental and applied research in various engineering and related disciplines that supports the current and future needs of national and regional development in the Caribbean. The Faculty has five departments each of which aim to provide world quality education in Engineering, Geoinformatics and Geosciences, and innovative Research and Development.

Department of Chemical Engineering (CE)

During the past decade, the CE Department has been committed to provide national and regional service to the process industries including petroleum and petrochemicals, bauxite, sugar and food processing in the Caribbean. The Department recognized the need to promote industrial linkages, applied research, fundamental research and the continuing education of persons in Chemical Engineering and relevant disciplines. Its research efforts have geared towards solving the problems in the broad areas of Agricultural crop processing; Enhanced oil recovery; Food science and technology; Heavy oil recovery; Industrial pollution

control; Mineral processing; Natural gas engineering; Petroleum processing technology; Process design, Optimisation and Control; Reaction engineering; Reservoir engineering; Sugar technology and Utilisation of biomass.

Department of Civil & Environmental Engineering (CEE)

The Department has eight laboratories: Structures, Concrete, Fluid Mechanics, Environmental Engineering, Soil Mechanics, Highway Materials, Geology and Transportation in the CEE Department. It obtains research funds from local agencies (e.g. the National Institute of Higher Education Research, Science and Technology) and international sources such as EU and the British Council and identified materials research, the built environment and the role of the construction sector in the local national economies as areas of high priority. Other areas of priority include the organisation and management of labour, the techniques of construction, operation and maintenance of facilities, the design of systems and the specification of materials. Additional focus is also placed on Hazard Resistant Construction and Coastal Engineering.



Department of Electrical and Computer Engineering (ECE)

The ECE Department has established five subject Groups to conduct research and collaborative work. These are:

- 1) Communication Systems Group in areas of mobile technologies for development, software designed radio, communications technologies and network;
- 2) Computer Systems Engineering Group in areas of computer architecture and organisation, embedded systems design and application, Video/Audio processing, Artificial Intelligence (AI) and robotics;
- 3) Control Systems Group in the development of interactive online control systems, fuzzy logic and robust control system design;
- 4) Electronic Systems Group in the design of reconfigurable logic systems, multi-media signal processing, and sound profile of the steelpan, and
- 5) Energy Systems Group in the regional electrical systems at both utility and industrial levels, analysis and simulation of power systems, wind energy and control of electrical machines.

The Department also made significant contributions in the steelpan research and the commercial development of the instrument. Another area of keen research in the Department relates to theories of Space and Time Detection of the Ether.

Department of Mechanical & Manufacturing Engineering (MME)

The MME Department conducts scientific and applied research that supports the national and regional needs. This involves a wide range of important areas in five research groups, namely Biosystems Engineering, Manufacturing Engineering, Thermal Engineering, Engineering Mechanics, and Industrial Engineering & Management. Several research teams (such as Rapid Prototyping (RP), Industrial Engineering and Applications (IEA) and Technology Transfer and Management (TTM)) were formed. In addition to the Faculty's support, the Department leverages its resources by conducting research initiatives via its Centre for Enterprise Research Integration and other laboratories (e.g., CAD/CAM Laboratory and the newly established Brain-Computer Interface (BCI) Laboratory) and through collaboration with other

government agencies, professional bodies, academia and industry.

Department of Geomatics Engineering and Land Management (GELM)

(Previously, Department of Surveying & Land Information)

The GELM Department's research expertise is established in the ability to understand, capture and visualise the spatiotemporal phenomena and processes to provide reliable management options for decision-makers to achieve sustainable development. These objectives are achieved by using surveying, mapping, monitoring, modelling and spatial analysis tools and techniques. Cutting edge technology is being utilised in the research such as global positioning systems, satellite remote sensing and GIS. Besides, the Department engaged in the field of physical planning and development associated with policy planning, strategic and development planning, coastal zone planning and development control.

Over the period, priority areas and new themes of research have been identified and are being pursued. The research focus extends to areas covering geomatics,

geodesy, land administration, spatial analysis, geoinformatics, spatial and settlements planning, the environment and ecosystems.

Highlights of Research Contributions

The Faculty's Annual Reports for the past ten years had provided factual records and insights into some of the rich research undertaken or completed over the period. Apart from hundreds of research outputs in terms of refereed journal articles, technical/research papers and consultancy reports published in the period, there were several significant achievements highlighted below:

In total, 33 MPhil and 21 PhD research degrees in various engineering areas had been conferred along with hundreds of taught Master's graduates since 1999/2000.

The University of the West Indies honoured three of Faculty members, Professor Clement Sankat in 2000/01, Professor Richard Dawe in 2004/05 and Professor Kit Fai Pun in 2007/08, in recognition of their contributions in research in addition to other areas such as University Service, Public Service and Teaching.



In 2006/07, the UWI's Steelpan Research Lab and team led by Professor Brian Copeland (being the first recipient) had been honoured for their contributions with the Order of the Republic of Trinidad and Tobago, the Nation's highest award in recognition of the development of the Genesis Pans (G-Pans) and Percussive Harmonic Instrument (PHI).

Dr. Ronald De Four's Patent Cooperation Treaty (PCT) Patent Publication was published in March 2009 in the United States of America, following an earlier grant of a positive International Preliminary Examination Report (IPER) for his work on a Self-Starting Method and an Apparatus for Sensorless Commutation of Brushless DC Motors.

New research centres (such as the Centre for Enterprise Research Integration and the Centre for Coastal Engineering and Management) and other facilities (e.g. the Steelpan Research Laboratory and the Brain-Computer Interface (BCI) Laboratory) have been or are being established to strengthen the Faculty's research capabilities.

The Faculty has extended institutional collaborations for research via respective departments

with overseas academic and research institutions, for instance, the ECE Department developed a proposal for a Caribbean ICT Research Programme in 2008/09.

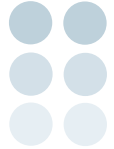
The Faculty's Research and Innovation Committee responded to the UWI Strategic Plan observation of the need for increased innovation to support Caribbean economic sustainability. It proposed a structure for a Caribbean-wide Innovation System that would not only see the expansion and improvement of business opportunities supported by UWI development activities but would also direct higher levels of UWI pure and applied research.

I am proud to present this report that summarises the research focuses and contributions of the Faculty of Engineering to St. Augustine Campus in the past decade. Perhaps of greater importance to the research accomplishments was the benefit gained by sharing knowledge through collaborations among staff within and across departments and with other government, academic and industry partners. The Faculty's goal is not only to respond effectively to the stakeholders, but also to build collaboratively research links and leadership.



Andrew Chadwick

Professor - Coastal Engineering
Director, Centre for Coastal Engineering & Management



Andrew Chadwick is the Professor of Coastal Engineering and Director, Centre for Coastal Engineering and Management, at the University of the West Indies. Previously, he was Professor of Coastal Engineering and Associate Director of the Marine Institute at the University of Plymouth. He was awarded a BSc. in Engineering Science from University of Durham (1974), M.Sc. Water Resources (1978) from Newcastle University, and in 1990 was awarded his PhD. from the University of Brighton. He has a substantive publication record (circa 100 publications), including two internationally used textbooks, refereed journal papers and international conference papers. To date, his research grants total circa £2 million, comprising funding from UK research councils and the European Union.

Since 1986, his research work has centred on near-shore wave measurements, coastal sediment transport, hydrodynamic and morphodynamic numerical modelling. The emphasis of much of this work has been in evaluating and validating theory and models against field and laboratory data and in identifying key processes to be modelled. His research focus is on the use of coastal hydrodynamic and morphodynamic models, field and physical scaled model measurements, detached breakwaters, coarse grained and mixed beaches and studying barrier beach systems.

He led the research team studying large scale physical modelling of detached breakwater schemes in the UK Coastal Research Facility (basin 34m by 20m). He was also a member of the steering group for the EU funded experiment that produced near full-scale meas-



urements of coarse and mixed sediment beach profile response in the 300m long, 7m deep, 5m wide GWK flume in Hannover. In 2002-2004, he led a research team investigating coastal processes for the Slapton Barrier Beach System, a major UK barrier beach system. Between 2006 and 2009, he led the UK contribution to the European Network for Coastal Research Co-ordination Action (ENCORA) and was the ENCORA themes co-ordinator (http://www.encora.eu/coastalwiki/Main_Page).

He has been a member of the editorial Panel for *Maritime Engineering*, the review board for the *Journal of Hydraulic Research*, the EPSRC Peer Review College





and a reviewer for *Coastal Engineering*. He is also a member of the following professional associations: CEng & MICE.

On his appointment as Professor at the University of the West Indies, St. Augustine, Chadwick established the Centre for Coastal Engineering and Management (CCEM). Its mission is to undertake research of international excellence in the field of coastal engineering and management, by conducting research on an experimental, computational and theoretical basis into all aspects of coastal processes, engineering and management and providing a focus for research training and technical service support for coastal agencies and industries.

CCEM has six academic staff and five research students currently engaged in the following research projects:

- The development of a Coastal Monitoring System for Trinidad.
- The development of a prototype shoreline management tool for Trinidad.
- The development of a web based coastal atlas, containing geo-referenced marine and coastal data for Trinidad and Tobago.
- The application of wave transformation and sediment transport modeling to assess coastal erosion hotspots around Trinidad.
- Assessment of storm surges and resurgences for the coastlines of Trinidad with the impacts of sea level rise in the face of climate change.
- The establishment of a coastal observatory in Las Cuevas Bay.



ANDREW CHADWICK

Professor - Coastal Engineering
Director, Centre for Coastal Engineering and Management
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PUBLICATIONS

Authored Books:

Chadwick, A J, Morfett, J C, Borthwick, M. (2004). *Hydraulics in Civil and Environmental Engineering* (4th ed) E & FN Spon

Reeve, D., Chadwick, A. J., Fleming, C. (2004). *Coastal Engineering: Processes, Theory and Design Practice* E & FN Spon.

Refereed Journal:

C Gray-Bernard, A J Chadwick. (2009). Development of a shoreline Management Tool for Trinidad. *The Journal of the Association of Professional Engineers of Trinidad and Tobago*. Vol. 38, No. 1 October 2009 33-41



Brian Copeland

Dean, Faculty of Engineering
Professor - Electrical and Computer Engineering



Brian Copeland graduated at the University of the West Indies, St. Augustine with a BSc in Electrical Engineering (First Class Honors) in 1978, with an M.Sc in Electrical Engineering (Control Systems) from the University of Toronto in 1981 and with a PhD in Electrical Engineering (Control Systems) from the University of Southern California in 1990.

He is a Professor in Electrical and Computer Engineering and Dean of the Faculty of Engineering at the University of West Indies since 2007. He was Head of the Department of Electrical and Computer Engineering at UWI from 1997 to 2007.

He lectures in Digital Electronics, Microprocessor Systems and Control Systems, has been responsible for the restructuring of the Department's Undergraduate Curriculum in Digital Electronics and Control Systems and remains an active lobbyist for engineering education reform.

He is Co-ordinator of the Real Time Systems Group, a UWI unit for developing university/industry liaison.

Professor Copeland is Project Leader for design and construction of the Electronic Scoreboard at the Queen's Park Oval. He is also Co-ordinator, Steelpan Initiatives Project (SIP) responsible for the G-Pan and PHI instruments and Convener at Steelpan Research Centre, UWI, and a Member of the Board of Directors, eTecK and Chairman, National Training Agency.

Professor Copeland has won many prestigious awards among them he is the first recipient, Order of the Republic of Trinidad and Tobago, 2008, a Joint recipient of the Chaconia Medal Gold as a member of the G-Pan team, he received the Guardian Life Premium Teaching Award in 2002, the BP/AMOCO Fellowship Award for Senior Academic Staff at the UWI, 2001 and a LASPAU/Fulbright scholarship for Doctoral program at the University of Southern California, Los Angeles, 1987 among others.



Research and Development Interests

1. Steelpan technology: amplification, digital synthesis, sound field mapping and modal studies
2. Technology Management in developing countries
3. Design of numerically stable advanced control system algorithms with special emphasis on H-2 (H₂)- and HInfinity (H_∞)- norm optimisation for strictly proper systems
4. Supervisory Control and Data Acquisition Systems (SCADA) and Distributed Control Systems (DCSs) for wide area computer monitoring and control
5. Design of microprocessor systems for control
6. Design of complex logic systems (including floating point co-processors and small microprocessors) using Complex Programmable Logic Devices and Field-Programmable Gate Arrays

Patents

1. US Patent 7,750,220 B2 of July 6, 2010. The G-Pan Musical Instrument.
2. Trinidad and Tobago TT/P/2009/00030 of 2009 An Apparatus For Percussive Harmonic Musical Synthesis Utilizing MIDI Technology (APHAMS). Co-inventors: Marcel Byron, Keith Maynard, Earle Phillip. Also filed under PCT as PCT 2007/000002. PCT IPER granted, patent pending in the USA, patent filed in 28 other jurisdictions
3. Trinidad and Tobago TTP/2009/00050 of 2009. The G-Pan Musical Instrument, (with PS in the Office of the Attorney General, Trinidad and Tobago). Also filed under the PCT as PCT 2007/000001. PCT IPER granted, patent filed in 60 other jurisdictions
4. Trinidad and Tobago 1993, #21 of 1993. Electro-acoustic pan using variable reluctance pickups.
5. Trinidad and Tobago 1993, #20 of 1993. Electro-acoustic pan using piezo-electric pickups.
6. Trinidad and Tobago 1983, #62 of 1983. An Electronic Steelpan (co-inventor: Dr. Stephan Gift)

Selected Conference Presentations and Publications

1. B. Copeland, R. DeFour, S. Gift and St.C. King, Sustainable development in T&T and the Caribbean, Sir Arthur Lewis Memorial Conference, UWI, St Augustine, September 25-27 2008
2. Copeland, B., and Roberts, S., International Accreditation for Engineering Education in the Caribbean, presented at the CANQATE 2005, Conference Caribbean Area Network for Quality Assurance in Tertiary Education (CANQATE), Crowne Plaza Hotel, Port-of-Spain, November 2005
3. Copeland, A. Morrison and T. Rossing, Sound Radiation of Caribbean Steelpan, Journal of the Acoustic Society of America, July 2004
4. Muddeen, F., and Copeland, B., Free-field sound measurements of the Caribbean Steelpan – an application of Cepstrum Analysis, to be presented at SoutheastCon 2003, Jamaica, April 4-6 2003.
5. B. Copeland and F. Muddeen, Observations on Measurements taken of the Sound field of a Clifford Alexis Double Second Pan (Where to (not) put the microphone), Presented at the World Steelpan Music Festival Conference Session, October 2002, Trinidad and Tobago.
6. B. Copeland, A. Morrison and T. Rossing, Sound Radiation of Caribbean Steelpan, Presented at the 142nd Meeting of The Acoustical Society of America, Dec3-7 2001, Florida.
7. Foley, M.W., Kwok, K.E. and Copeland, B., Polynomial LQ Solution to the Averaging Level Control Problem, Presented at the 16th International Conference on CAD/Cam, Robotics and Factories of the Future, Trinidad and Tobago, June 26-28, 2000.
8. B. Copeland and M. G. Safonov. A Generalized Eigenproblem Approach to Singular Control Problems - Part II: HInfinity Problems. Proc. of the 31st IEEE Conference on Decision and Control, Tucson, Dec 1992.



BRIAN COPELAND

Dean - Chair - Elec. & Computer Eng.; Leader - Control Sys. Group;
Prof - Digital Elect., Microprocessors
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PUBLICATIONS

Gift, S. and Copeland, B., "A High Quality Mixer Circuit", *West Indian Journal of Engineering*, Vol. 23, No. 1, July 2000, pp28-35.

Copeland, B. "Design of a Power Demand Controller: Testing Regional Design Strategy". *West Indian Journal of Engineering*, Vol. 22, No.1, July 1999, pp20-28.

Copeland, B. "Pickup Methods for the Electro-Acoustic Steelpan". *West Indian Journal of Engineering*, Vol. 18 No2. January 1995 pp41-48.

B. R. Copeland and M. G. Safonov. "A Zero Compensation Approach to Singular H₂ and H_∞ Problems". *Journal of Robust and Non-Linear Control*, Vol. 5, pp71-106, 1995

Richard Dawe

TTMC Chair in Petroelum Engineering
Department of Chemical Engineering



Professor Dawe's major petroleum research interests (which were the basis of his appointment as Professor) lie in the areas of reservoir engineering and petroleum geoscience, particularly visualising reservoir behaviour and reservoir physical properties. His research seeks to explain how an oil reservoir can work through an examination of the fundamentals of enhancing oil recovery, hydrocarbon thermodynamics, effect of geological heterogeneities on reservoir behaviour, surface phenomena in porous media, and alternative energy.

Research Interests since 1999

In 1999, Professor Dawe was appointed TTMC Chair in Petroleum Engineering. Subsequently, his research initiatives concentrated on the needs of the Trinidad and Tobago hydrocarbon producing industry. The results have been presented in 67 papers since 1999, in refereed and non-refereed international journals, and one edited book with two chapter contributions.

Current research interests can be summarised under the general topics:-Reservoir engineering and petroleum geosciences; heavy oil recovery—particularly VAPEX and foamy oil; use of hydrates—transport, desalination of sea-water, potential gas source; hydrocarbon thermodynamics and physical properties of petroleum fluids, including hydrates, gas condensates; effects of reservoir heterogeneities; surface phenomena in porous media; water de-oiling of oilfield wastewaters by gas flotation; desalination of seawater; fundamental aspects of enhancing oil recovery; development of novel visualisation of oil recovery phenomena; novel apparatus for teaching purposes; and sustainability—energy, food, employment, water.

Recent projects include:

Heavy oil problems:

Topics being investigated include recent developments in heavy oil enhanced recovery, particularly gravity drainage processes using vapour extraction via horizontal wells (the VAPEX processes), down hole heating, foamy oil and the (often) resulting asphaltine production problems.

A new process VAPEX (Vapour Extraction) using horizontal wells and volatile solvents are being developed, mainly in Canada. Sometimes heat (steam) is also proposed to lower the viscosity, but this increases energy costs and CO₂ emissions. The VAPEX process has been investigated by experimental work to demonstrate gravity drainage flow in films at the macro- and micro-scale.

Natural Gas Hydrates (NGH):

A "new" huge source of natural gas exists—that of

natural gas hydrates, NGH, with the gas being mainly methane. Large sources of NGH are being identified by seismic reflection below the sea-floor in the oceans' sediments near continental shelf plates. NGH could possibly solve much of the energy needs after 2020, but safe ways of extraction still have to be designed. When exploitation becomes viable, Trinidad's gas industry needs to be very astute to ensure she benefits from her own reserves of NGH, which are present in the deeper offshore areas.

Equally important is hydrate technology development, which has focused on conversion of methane to solid (GtS) hydrate for the feasibility of transporting stranded natural gas to market around the Caribbean using gas hydrates. This could be a lower cost solution to managing associated gas in regions lacking gas infrastructure and/or markets. Compared to alternative technologies such as LNG and gas to liquids, GtS hydrates conversion is relatively simple, low cost and does not require complex processes or extremes of pressure or temperature. There could be possibilities for NGH for transport of natural gas from Trinidad to the Caribbean Islands at volumes much less than those normally considered for LNG, but still commercial within the whole transport chain from producer to consumer.

Another direction being explored is the desalination of sea-water through gas hydrates. This is because sea-water when first freezes forms crystals of pure water. The problem is how to use this physical process to economically produce potable water on the massive scale needed to satisfy human and agricultural needs. Difficulties of separation of the ice from the mother liquor are significant.

Gas Condensate Fluid Studies:

Many of the gas reserves off the East coast of Trinidad contain a significant proportion of gas condensate fluids. When these fluids are produced to surface, the components can be separated by fractionation into gas and liquid fractions at

the surface facilities at Phoenix Park. The premium components, propane and butane, generate an additional source of income. All of Trinidad's gas condensate reservoirs are currently produced by pressure depletion, as their oil/gas ratios are significantly less than 50 barrels per million standard cubic feet, so depletion processes are practiced, thus some, but not all, possible condensate recovery occurs.

Some of the PVT properties of condensate reservoirs relevant to the nature of the behaviour of Trinidad's reserves have been measured, and consideration given of how a producer may obtain the contracted rates of gas delivery of these high flow rate wells (> 100 million scf/day), but still have maximum economic benefits from condensate recovery.

Heterogeneity effects (permeability and wettability) on reservoir flow and displacement.

This study demonstrates the importance of incorporating reservoir heterogeneity into pore displacement analysis, but of course the nature of the heterogeneity has to be known. Generally, interpretation of flood experiments in heterogeneous core material is hampered by the effects created by the (unknown) boundaries of the heterogeneities. These experiments therefore provide clear visual information to provide a firmer understanding of the displacement processes during immiscible displacement, and to present data for input to numerical simulators, and to validate the simulator through a comparison with these experimental results.

Sustainability; energy, food, employment, water.

Countries having hydrocarbon reserves (oil and/or natural gas) are considered fortunate compared with others that have to import their energy.

Thus, approaches to long-term sustainability should be considered whilst the resources are present, and must include programmes to develop sustainable energy, food, water supplies and satisfying employment as well as to produce lucrative exports.



RICHARD DAWE

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PUBLICATIONS

Editor of *Modern Petroleum Technology, Upstream* Volume 550pp published by John Wiley for Energy Institute (UK), August (2000) and author of Chapters: Introduction - New Technological Developments- pp xxiv-xxvi Introduction -Fundamentals pp23 *Reservoir Engineering* pp 75

Journals

R Hosein, W Bertrand and R A Dawe, *Trinidad and Tobago heavy oil recovery, The Oil Sands & Heavy Oil Technologies*, Calgary, Alberta, Canada, July 20-22 (2010)

J Marcelle-De Silva and R A Dawe, Experimental studies of the effects of permeability variations on immiscible flow, *Petroleum Science and Technology*, 27(5) 498-510 (2009)

Edwin Ikenna Ekwue

Professor - Agriculture (Biosystems) Engineering
Head, Department of Mechanical and Manufacturing Engineering



My main area of research is investigating the effect of organic materials on the physical and engineering properties of soils that affect soil erodibility, soil compaction and compressibility by farm machines working on soils. The understanding of these effects and their consequent quantification has been the thrust of my research activities over the years. My research recently extended into the investigation of the role of organic materials into some other engineering properties of soils like thermal and electrical conductivity of soils.

Soil erosion by rainfall is a function of soil erodibility, land topography, vegetation and soil erosivity by rainfall. Soil erodibility is affected by soil texture, organic matter content, soil structure and soil permeability. Soil erodibility refers to the vulnerability of the soil to erosion, that is the soil factor in the soil erosion process. My initial PhD research focussed on the role of organic materials on soil erodibility. It involved the study of the effect of organic materials on all the major factors that affect soil erodibility: soil detachment, infiltration, soil shear strength, soil crust strength, soil compaction, soil aggregate stability and aggregate breakdown. It exposed the two major processes involved in the reduction of soil erodibility by organic materials: stabilising soil aggregates by colloidal organic materials like grass, farm yard and green manure and acting as a mulch like fibrous inert particles like peat. The research helped to explain the different opposing relationships previously obtained by different researchers, like the relationship between soil detachment and aggregate stability. The relationship was found to be positive for fibrous organic matter and negative for the colloidal ones. Also, not well understood was the effect of organic matter on soil shear strength. This was also found to depend on the type of organic materials. All organic materials were exposed as being able to reduce bulk density, increase soil porosity, reduce soil erodibility and increase infiltration rates of the soil.

My research also revealed that the type of organic material like peat, grass, green manure and not just the total organic matter content was important in soil erosion research. These effects were described and quantified. The effect of soil strength on detachment was described and a model equation was developed to describe soil detachment.

Lastly, the study involved the development of equipment required in soil erosion research including the design and construction of rainfall simulators, soil air permeameter, soil penetrometer and a novel equipment for measuring infiltration rates of soils during rainfall. This PhD research led to the publications of nine journal



papers in the area of soil erosion research.

On coming over to The University of the West Indies in St. Augustine, Trinidad, the methods required to boost agricultural production in the Caribbean region was reviewed emphasising the supply of more irrigation infrastructure and tractors for large-scale food production.

On the irrigation side, water available for irrigation in Trinidad was found to be limited prompting research on the best use of limited water allocated for irrigation. The level of water required to irrigate different crops in the local setting was quantified using lysimeters as well as using the empirical best model, Penman-Monteith, which was soon discovered. Rainfall available to Caribbean countries was statistically analysed to obtain rainfall parameters required for irrigation scheduling. Irrigation scheduling using the computer-aided irrigation system called IRSIS was soon investigated and used to schedule irrigation as well as to predict the level of water needed in different farming situations in the Caribbean. The use and implication of different evapo-

The current research I am doing is to examine, model and quantify the thermal and electrical conductivities of soils from different parts of Trinidad. These values are required in the pipe and cable laying processes now taking place in the country.

Edwin Ikenna Ekwue

ration pan sizes for scheduling irrigation was identified in different research works.

Also investigated was the effect of soil compaction on irrigation scheduling of some crops in Trinidad. It was found that the maintenance of adequate irrigation regime in the soil would help to ameliorate the effect of soil compaction in reducing plant growth. The use of hydroponic and aquaponic systems of irrigation have also been investigated and further studies are required in this area.

Greater use of tractors in soil cultivation in Trinidad and the Caribbean in general will result in environmental problems principally soil compaction and compressibility and so these studies of farm machinery traffic was important. Therefore, methods of reducing soil compaction was sought, specifically the use of organic materials in reducing soil compaction. The first part of this research involved the quantification of the impact of different compaction efforts on soil shear strength, soil bulk density and soil penetration resistance, which are all indices of soil compactibility. Research revealed that organic materials like farm yard manure, peat, filter press mud and sewage sludge can be used to ameliorate the impact of farm machinery traffic on soil compaction. These effects were quantified and some novel equations that could be used to do this were identified.

This study of soil compaction and compactibility was extended in 1998 to the wetland soils Trinidad, especially Nariva Swamp where there were farmers who were then using heavy machinery to cultivate rice as well deplete water in channels in the area during the dry season, therefore negatively affecting the environment of the swamp in terms of soil compression and salt water intrusion as a result of lowered water levels. The major finding from this further study was that while increased use of tractors could increase agricultural production on wetland soils in Trinidad; this will cause large compression and compaction. Rice is well adapted to these high levels of soil com-

paction and compression, but since it requires irrigation during the dry season, this limits the water required to maintain the swamps. Large-scale production of rice was not recommended in Nariva swamp and other wetland soils. Rather, a land zoning policy that allows for the cultivation of vegetables and carrying out of other farming activities in selected parts of the wetlands was preferred. This recommendation formed part of the report of the environmental impact assessment of the area submitted to the Government of Trinidad and Tobago in 1999. The soil compaction work was also related to study the soil physical and engineering properties of common soils used in cricket pitches in Trinidad. These properties were studied in relation to their roles in soil pace, soil spin and bounce of the ball. It was found that of all the soils studied, the Sevilla Clay was the best to be used in cricket pitches in Trinidad. This work is to be continued.

The current research I am doing is to examine, model and quantify the thermal and electrical conductivities of soils from different parts of Trinidad. These values are required in the pipe and cable laying processes now taking place in the country. Detailed research work involves the determination of the effect of compaction levels, soil water content, soil types and organic matter contents on these thermal and electrical conductivities and the implication of these values for laying of underground pipes and cables required in the growing liquefied natural gas industry in Trinidad. The study of electrical conductivities will also reveal the implications on the corrosion rates of underground pipes used in the water and other industries in Trinidad.

Latest research efforts have been the engineering design, construction and testing of soil erosion, soil sieve apparatus and water measuring devices. These have been used to quantify the effect of compaction effort, organic matter contents, soil type and rainfall effects on soil transport both by overland flow and raindrops.



EDWIN IKENNA EKWUE

Professor of Agricultural
(Biosystems) Engineering
(Soil and Water Resources
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PUBLICATIONS

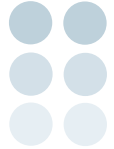
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Stephan Gift

Professor - Electrical Engineering
Department of Electrical and Computer Engineering



Professor Stephan J. Gift started graduate research in optimal control theory in the Department of Electrical Engineering under Professor St. Clair King in 1976 leading to a PhD in Electrical Engineering in 1980. Subsequently, he was appointed a full lecturer in the Faculty of Engineering at age 24, one of the youngest lecturers at the St. Augustine Campus. Following a 12-year period in industry, he began a period of intensive investigation in electrical engineering and its foundations resulting in his professorship in 2005. He has published over 60 papers in international peer-reviewed journals. Professor Gift has been invited to review papers for 13 major international engineering journals and to sit on the editorial board of the renowned international journal *Passive Components*.

His contribution to electrical engineering was recognised in 2008 when he received the Bishop's High School Tobago Alumni Association's 2008 Distinguished Alumni Award for Engineering. He also received recog-

nition from the Institute of Electrical and Electronic Engineers, which elevated him in October 2003 to the level of Senior Member, and was elected Fellow of the Association of Professional Engineers of Trinidad and Tobago. Other awards included the Young Innovator award from the Ministry of Culture (1986) and in 2002, the Prime Minister's Award for Innovation and Invention in Electronics.

Some of his contributions in the field of academia and industry are outlined in the sections that follow.

Electrical Engineering

Over the past several years, in the area of electrical engineering he has conducted research in the design of new electrical systems including electronic filters, instrumentation amplifiers, current and voltage amplifiers, and precision rectifiers. Simultaneously he published over 35 papers on these designs in international refereed journals. Recently, he introduced a complementary



circuit element called a Current Feedback Conveyor that is one of only two current amplifiers that can be assembled with commercially available integrated circuits. He also introduced several new current feedback amplifier circuit topologies. Many of his papers in electronic circuit design are cited by other researchers. This research is being conducted with Professor Brent Maundy of the University of Calgary.

As a direct result of this work he received a BPTT Fellowship and was granted two half-year sabbaticals to prepare a textbook on Electronic Circuit Design with Professor Maundy of the University of Calgary. The manuscript is almost completed and a publisher is to be identified shortly.

Science of Engineering

In the area of the science of engineering, he has been examining the science of engineering and has published over 20 papers on his findings in international peer-reviewed journals. In two papers, he proposed a new particle model that suggested that electrons are not elementary particles as is currently believed but like protons and neutrons are made up of quarks. This idea is new and provides persuasive answers to a broad range of questions unanswerable by the existing Standard Model.

He has also published a new theory of the magnetic force observed in many household magnetic devices, for which there is no explanation. This model predicts the existence of a new massless particle, which he refers to as a magnaton that is the agency that creates the magnetic force.

In related work he has shown that Einstein's Theory of Relativity, one of the most celebrated ideas in the history of science that is based on the notion of light speed constancy, is flawed. This research has attracted some international attention. Most notably he has been invited by a leading Italian physicist to write the foreword of his forthcoming

book in which he confirms the invalidity of relativity theory and describes what many consider is the correct theory of space and time.

Of great significance is his accomplishment in detecting an inter-galactic cosmic medium that has eluded detection by the international scientific community for over 100 years. This universal all-pervasive medium, known in the 19th century as the ether, was believed by all scientists to be the carrier of light and all electromagnetic radiation but is today considered undetectable.

He also has been invited to review papers for the international journal *Physics Essays* and the *Journal of Scientific Exploration* and to speak at numerous seminars and presentations on this area of his work.

He received awards for this work from The Friends of the Tobago Library Committee who selected him as Individual of the Year 2006 for scientific contribution, from the Electronics Department of the Servol Centre at La Romain in 2005 for his claimed detection of the ether and previously from the UWI Guild of Graduates who presented him with the Pelican Award for Excellence in Science and Technology in 1993.

Public Health

Over the past four years, Professor Gift has been actively involved in investigating and evaluating published research on the health effects of electromagnetic radiation and bringing this information to the attention of the public in Trinidad and Tobago through reports, seminars, public lectures and letters in the newspapers.

He recommended the rejection of the standard for radiation exposure recommended by the World Health Organization and the development of a new standard for Trinidad and Tobago. Consequently, he was appointed to a committee established by the Trinidad and Tobago Bureau of Standards for the development of such a standard.



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PUBLICATIONS

S.J.G. Gift, *A Quantum Theory of Magnetism, Progress in Physics*, Vol. 1, January 2009, pp 7-19.

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Timothy Michael Lewis

Professor - Construction Engineering & Management
Department of Civil & Environmental Engineering



Professor Lewis's research over the years emphasised the economics of the construction sector in Trinidad and Tobago and the role of construction in the development process particularly, in a developing country (investigating the Bon Curve). Through collaboration with Dr. Roger Hosein (Dept of Economics, UWI) this research has been enhanced and published in two renowned journals thus far. This research is on-going and some aspects of the current work was presented at an Inaugural Professorial Lecture in 2008. It also formed the basis for a chapter in the leading text book "Quantifying the GDP-construction relationship", in *Economics for the Modern Built Environment* edited by Prof L. Ruddock, Taylor & Francis, New York/Oxford. (2009).

Most recently, Professor Lewis was invited to contribute a chapter called "The Study of Construction Management: International Development – Caribbean Region" in *Construction Management: Building a Discipline* edited by Prof D. Langford, Taylor & Francis, New York/Oxford, (2009). His current publications are awaiting review and relate to an economic perspective on traffic and congestion and on health and safety in the construction industry.

In 2005, he became Professor, Construction Engineering and Management, Department of Civil & Environmental Engineering, UWI, St Augustine. On his appointment he conducted a complete review of the programme and a major restructuring of the programme and the courses. As a result, a new postgraduate course in Research Methodology (COEM6020) and a Practical Team Project (COEM6025) for postgraduates were introduced in the programme (both with Dr. Andrew Petersen). The restructuring has been done in line with the international trend towards 'learning outcomes' and revised forms of assessment.

For the period 2005-2006, Professor Lewis was appointed as Deputy Dean, Faculty of Engineering, Distance Education & Outreach and between 2006 and 2008 as Deputy Dean, Faculty of Engineering, Research, Graduate Studies and Outreach. From 2007 until the present, he was appointed as External Examiner, Construction Management Programme, University of Technology, Kingston, Jamaica, and since 2008 served as External Examiner (Construction Economics & Management) for the University of Cape Town, South Africa

He designed, developed and implemented a new MSc programme in Construction Management delivered in the University of Guyana in 2006, and assisted UWI, Cave Hill in the development of a new MSc in Building and Construction Management during 2009, for the first cohort that was accepted in January 2010.

Among his recent publications are two journal articles:

- "Impact of globalization on the construction sector in developing countries" (2007), *Construction Management and Economics*, Volume 25 Issue 1, Jan (pp.7-pp.23) and
- "A Comparison of Highway Construction Costs in Guyana and Trinidad" (with C.J. Willis) (2009), *Journal of Construction Procurement*, Vol. 13, No. 1 (pp 14-23)

He was editor of a book and CD – *Construction In Developing Countries: New Issues and Challenges* from the Proceedings of the International Symposium on Construction in Developing Countries, Port-of-Spain, Jan 16-18, 2008.



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PUBLICATIONS

"Creativity on the Teaching Agenda", *European Journal of Engineering Education*, Vol 29, No 3, Sept, 2004 (pp415-428)

"The Construction Industry in the Economy of Trinidad & Tobago", *Construction Management and Economics*, Vol 22, No 5, June 2004 (pp 541-549).

(With Dr R. Hosein) "Quantifying the relationship between aggregate GDP and construction value added in a small petroleum rich economy - a case study of Trinidad and Tobago", *Construction Management and Economics*, Vol 22, 2004

"North Sea Oil and Scotland's Economic Prospects", Croom Helm, London, 1978 (co-author Dr. I.H. McNicoll)

Winston Lewis

Professor - Manufacturing Technology; Plant Layout & Ergonomics
Department of Mechanical & Manufacturing Engineering



Professor Lewis has been promoting research and development work at the University of the West Indies in the multidisciplinary areas of metallurgical and industrial engineering, sheet metal forming, manufacture of the steelpan musical instrument, applied ergonomics and workplace design, engineering quality management and nano-technology. This work has been published in leading international and regional journals such as: *The Journal of Mechanical Working Technology*; *ASME Journal of Engineering for Industry*; *Journal of Applied Ergonomics*; *Journal of Materials Processing Technology*; *Journal of Quality & Reliability Management*; *Journal of Cleaner Production*; *International Journal of Manufacturing Technology and Management*; *Journal of Materials and Manufacturing Technology*; *West Indian Journal of Engineering*; *Journal of Machining Science and Technology*; *Journal of Metal Finishing*; *Journal of Bio-Technology*; *The TQM Magazine*; and *The Asian Journal of Quality*.

Professor Lewis has authored 78 academic papers of which 40 are journal papers and 38 conference papers. He has also successfully supervised one Ph.D. candidate, three M.Phil. candidates, and 50 Graduate Students

His research and development work was recently highlighted in 60 Under 60, a special 60th Anniversary commemorative edition of UWI's Pelican Magazine.

Past research work by Professor Lewis:

Metallurgical Engineering:

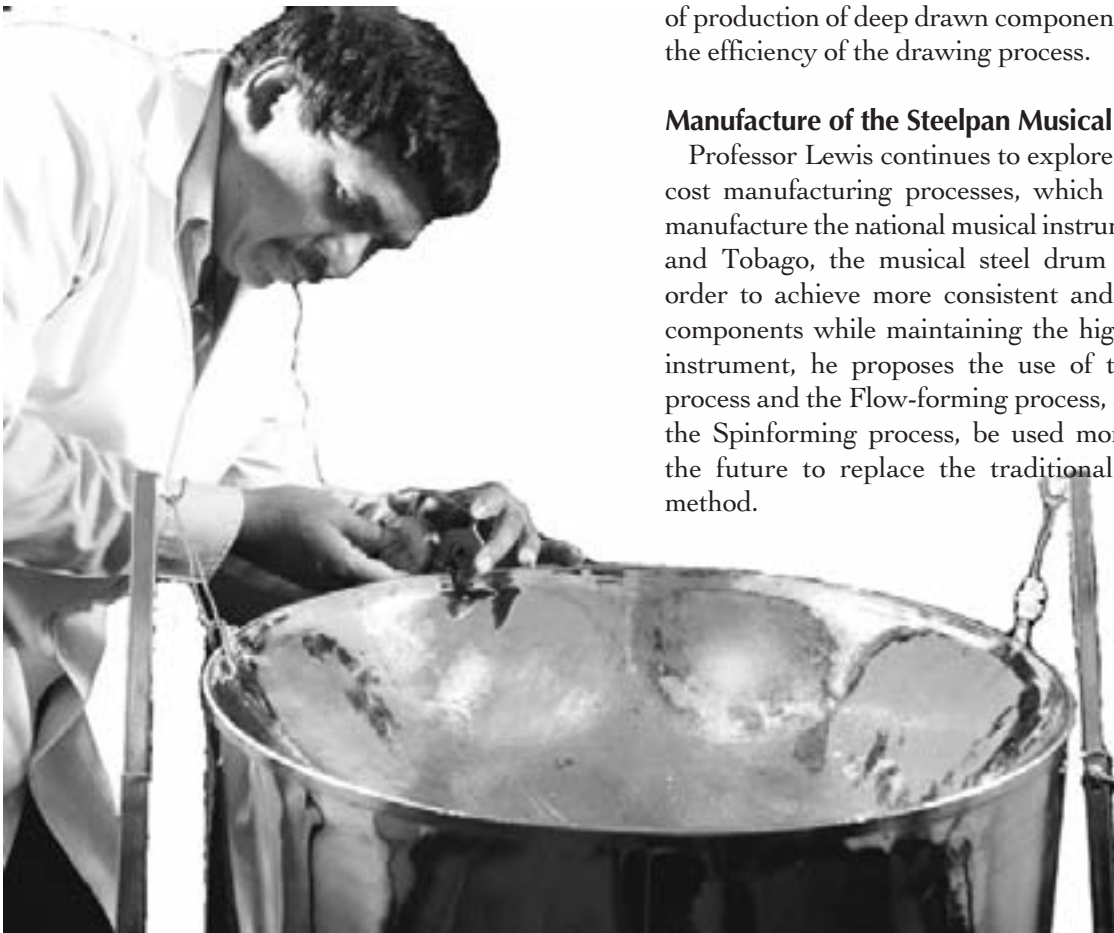
In an attempt to revive the foundry industry in the region, Professor Lewis has investigated the use of indigenous sources of iron such as direct reduced iron (DRI) pellets for the production of ductile iron castings using small typical medium frequency induction melting furnaces found in small foundries in developing countries such as Trinidad and Tobago. He continues to apply his knowledge in sustainable facilities design and ergonomics to develop suitable facilities for this purpose.

Sheet Metal Forming:

Professor Lewis developed a new method of applying blank holding force approximately proportional to the punch force in cup drawing. This has reduced the cost of production of deep drawn components and improved the efficiency of the drawing process.

Manufacture of the Steelpan Musical Instrument:

Professor Lewis continues to explore innovative low-cost manufacturing processes, which can be used to manufacture the national musical instrument of Trinidad and Tobago, the musical steel drum or steelpan. In order to achieve more consistent and deeper formed components while maintaining the high quality of the instrument, he proposes the use of the Marforming process and the Flow-forming process, an adaptation of the Spinforming process, be used more frequently in the future to replace the traditional Hand-forming method.





Ergonomics Design of Handles for Hand Tools:

Professor Lewis has applied ergonomics in the design of handles for hand tools. It has been shown that the stresses exerted on the flexor and extensor muscles of the arm while using the ergonomically designed handles are lower than those exerted while using the traditional tool handles. Thus the risk of injury through repetitive trauma disorders are greatly reduced while allowing for higher working efficiencies.

Engineering Quality Management

Over the past decade Professor Lewis' research and development work has been focused mainly on the development and use of Quality Management Systems (QMS) and Standards for use in the workplace in to improve safety, quality and efficiency. To this end, he has worked with the Trinidad and Tobago Bureau of Standards (TTBS) to develop Workplace Standards.

Professor Lewis and his research team have worked on a number of practical research methodologies that take cognisance of the peculiarities of small and medium-sized manufacturing enterprises (SMMEs) and the impact on their quality management practices in developing countries. The research team has also ranked the critical factors (CFs) and quality management principles (QMPs) that determine the success of total quality management TQM as it applies to QMS implementation in SMMEs. They have used the literature on TQM implementation in SMMEs operating in a developing environment and identified critical factors and prioritised them according to the frequency in which they appeared in publications. The team identified critical factors of TQM imple-

mentation for SMMEs operating in developing economies. The research team has developed a scale for measuring top management commitment towards continual quality performance improvement in SMMEs. Empirical studies were conducted to acquire senior management views on the use of the QMP Scale in the manufacturing sector in Trinidad and Tobago. A self-assessment scale was developed to measure top management commitment, which provides practical insights for evaluating the levels of maturity on performance improvement in SMMEs. The team has also developed a self-assessment scale, the Employee Perception Scale (EPS), and investigated the reliability and validity for measuring employees' perception towards the continual improvement of SMMEs.

Current research interests of Professor Lewis are Sustainable Facilities Design and Nano-technologies.

Nano-technology:

Nano-technology is becoming critically important in various industrial fields, introducing new platforms for wealth creation and offering an abundance of opportunities for improving the standard of living. In the global scenario, nano-technology is recognised as the enabling technology towards next generation devices which have gained enough confidence to have significant competitive advantages. Despite the massive developments in nano-technology around the world only traces of nano-initiatives are apparent in the Caribbean region. Professor Lewis and his colleagues at UWI have developed a research agenda which addresses a new interdependent approach to focus on niche areas.



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PUBLICATIONS

W.G. Lewis and C.V. Narayan, "Design and Sizing of Ergonomic Handles for Hand Tools". *Journal of Applied Ergonomics* Vol. 24, No. 5, October *Journal of Applied Ergonomics* Vol. 24, No. 5, October 1993, pp. 351-356.

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Jacob Opadeyi

Head, Department of Geomatics Engineering
and Land Management



Jacob Opadeyi (PhD, MBA, MRICS) is a Professor and Head of the Department of Geomatics Engineering and Land Management in the Faculty of Engineering. Currently, his research seeks to develop a regional Disaster Risk Management Benchmarking Tool (BTool) to improve the ability of national governments, civil society organisations and the private sector to proactively plan and implement effective and efficient actions that would reduce their vulnerability to natural disasters and create greater economic resilience when they do occur. The BTool has the following utilities:

- A tool for evaluating the adequacy of current disaster risk management tools.

- A tool for evaluating the readiness and capability of local national institutions to deal with the risk of disaster.
- A list of best practice recommendations for disaster risk management.
- A tool for regional benchmarking of nations and programmes.

The BTool was designed as a self-administering tool with responsibility for oversight, data analyses, data storage, data management, and quality control assigned to an independent regional lead agency such as the Organisation of Eastern Caribbean States [OECS]. It



is not intended, at this time, to be comprehensive given the following multi-dimensions of disaster risk management: risk exposure, geographic extent, and vulnerable elements. In terms of risk exposure, it was designed for multi-hazards with the scope to rework it for a particular hazard. In geographic extent, it could be redesigned for use at national, community, or enterprise levels. It is, however, customizable to meet specific dimensions.

In its present form, it covers all the vulnerable elements in general but may be redesigned to focus on any one of the following vulnerable elements: affected population, infrastructure, economy, and environment.

The tool was developed in six stages. These are:

- Selection of a comprehensive disaster management framework
- Identification of disaster risk management tools and resources
- Design of assessment questions
- Stakeholder review and modification of the tool
- Pilot testing and modification of the tool
- Adaptation of the tool by local and regional stakeholders.

The BTool may be used as both national and regional disaster risk assessment tools.

National Assessment

As a national assessment tool, it is recommended that a national multi-sector assessment team be established. The team should comprise of persons from the public sectors, business community, and community-based organisations. The work of the team should be supported by a research assistant who will be responsible for the sourcing of relevant documents, data, and information required to accurately respond to the assessment questions. If necessary, the team should be divided into six sub-teams, with each sub-team focusing on one of the six disaster risk management components: risk

identification, risk mitigation, risk transfer, disaster preparedness, emergency response, and rehabilitation and reconstruction. The team will score the adequacy of the country's risk management tools and resources and return an agreed score for each of the six components of disaster risk management.

Computing the indices

A two-step approach is proposed for the rating of a country's disaster risk management efforts. In the first step, the risk management index (RMI) for each of the six components of comprehensive disaster risk management (CDRM) is calculated. In the second step, the Total Disaster Risk Management Index (TDRMI) of the country is computed.

Calculating the Total Disaster Risk Management Index (TDRMI)

The Total Disaster Risk Management Index (TDRMI) of the country is the average of its score in each of the six components of comprehensive risk management. Using such indices, the country is able to identify the adequacy of its risk management initiatives, identify gaps, overlaps, omissions, as well as strengths and successes. The indices may be used to select and prioritise projects and programmes that will help to improve its future rankings.

The result of this assessment may also be used to develop remedial actions, programmes of work, and build support for budgetary allocations in the following years after the assessment.

Use of the BTool as a Regional Benchmarking Tool

The BTool may be used as a regional benchmarking tool for comparing the level of disaster risk management of one country against another. It has currently been adopted in seven Caribbean countries and it is currently being tested in all the British Overseas Territories of the Caribbean.



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PUBLICATIONS

Opaideyi, J. and Balfour Spence (2006). "Vulnerability Benchmarking Tool". A Technical Manual published by the Organisation of Eastern Caribbean States (OECS) and United States Agency for International Development/Caribbean Open Trade Support Program (USAID/COTS).

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Keith Miller and Jacob Opaideyi (2009). "New Geodetic Infrastructure for Trinidad and Tobago" *Surveying and Land information Science*, 69(10); pp19-28



Kit Fai Pun

Professor - Industrial Engineering
Department of Mechanical and Manufacturing Engineering

I joined UWI in 2001 as a senior lecturer and obtained my tenure and was promoted to Professor of Industrial Engineering (IE) in 2004 and coordinator of the Industrial Engineering Group in the Department of Mechanical and Manufacturing Engineering of the University. I now coordinate programmes, chair graduate studies and research for my faculty and lead a task force to having established The Centre for Enterprise Research Integration (ERI).

In 2006, I won the prestigious UWI/Guardian Life Premium Teaching Award for Excellence. In 2008, I was recognised in "60 under 60" as one of the 60 academics for UWI in terms of the broad range of academic pursuits and impact they have had and are having in the Caribbean region and abroad. In the same year, I was also a recipient of the 2007/08 Vice-Chancellor's Award for Excellence in Category V: All-round Performance in Teaching and Research. My biography has been selected for inclusion in The Marquis Who's Who in Science and Engineering since 2006.

Research Accomplishments

On the research sphere, I consider myself an active researcher among all Faculty colleagues. My research focuses on areas of Engineering Management and Systems, Industrial Engineering, Quality systems, and Technology Management. I apply technological enquiry to the capacity of organisations (particularly, small- and medium-sized enterprises in the Caribbean) in rapid commercialisation in business that is technology based. My work in developing a scale for measuring management behaviour is people and customer oriented.

Since 2001, I have written and contributed to writing more than 80 refereed journal articles and 40 conference papers, authored three books/book chapters, and edited seven special issues of journals and conference proceedings. I have received several honours in recognition of research from external bodies, among them the Top 25 Requested Papers for April 2002 - April 2004 in Expert Systems with Applications Publication: Chin, K.S., Pun, K.F. and Lau, H.C.W., "Development of a knowledge-based self-assessment system for organisational performance", Expert Systems with Applications, Vol.24, No.4, March 2003, pp.443-455 and the Recipient of the Emerald Literati Network 2006 Highly Commended Award Publication: Pun, K.F., "An empirical investigation of strategy determinants and choices in manufacturing enterprises", Journal of Manufacturing Technology Management, Vol.16, No.3, 2005, pp.282-301

Departmental Supervisions & Research

Since joining UWI, I have successfully supervised 60 final-year students' capstone engineering projects. These projects cover a wide spread of industrial engineering and engineering management areas, from laboratory- and technical-based to application-oriented and industry projects. At the graduate level, I successfully supervised 25 Masters' dissertations and four MPhil/PhD theses, and am currently guiding six MPhil/PhD students in areas of Innovation systems, Lean manufacturing, Quality management, Organisational learning, and Technology transfer. Simultaneously, I have intensified the publishing capacity of students and junior staff and contributed to resurgence of a research culture. Over the past years, I have more than 40 joint publications with my graduate students.

In fostering the university-industry collaboration to bring a synergy of research outputs across the Department at UWI, I have been leading a taskforce to establish the ERI Centre since 2004. One main challenge for the centre is to build and expand the capacity for research and innovation in the absence of structured national and regional mechanisms for funding relevant research. Since 2005, three research groups, namely Rapid Prototyping (RP), Industrial Engineering and Applications (IEA) and Technology Transfer and Management (TTM), were formed under my mentorship in the Faculty. Several research and industry collaboration initiatives such as rapid prototyping in glass products, environmentally recycling of plastics bottles, and simulation of distribution networks for motor fuels across the nation, are being developed. Moreover, I acquired research funding as Principal Investigator and Co-investigator for seven projects (amounted TT\$275,000 or US\$ 45,800) at UWI among them "Employee Empowered Quality Improvement in Manufacturing Enterprises in Trinidad and Tobago", (Completed in November 2004), and "Science and Technology: Vehicles for Sustainable Economic Development in the Caribbean" (Completed in October 2008).

Three selected research areas are elaborated below:

Area 1. Manufacturing Strategy Formulation and Performance Measurement

Measuring organisational performance plays a very important part in translating corporate strategy into results in manufacturing firms. Various emerging (non-traditional) performance measurement (PM) systems have recently devised to aid firms in selecting and implementing measures. This research provides guidance



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Pun, K.F. and White, A.S., "A performance measurement paradigm for integrating strategy formulation: a review of systems and frameworks", *International Journal of Management Reviews*, Vol.7, No.1, 2005, pp.25-46

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Pun, K.F. Sankat, C.K. and Motilal, C.B., "Towards collaborative agro-innovation in developing countries: the Caribbean perspective", *International Journal of Agricultural Resources, Governance and Ecology*, Vol.5, No.1, 2006, pp.51-74

about what to measure and how to design performance measures that could be linked to the corporate strategy and objectives of organisations.

Area 2. Total Quality Management and PM Practices

Competitive environments and priorities change over time, effective enterprise management always depends on the effective measurement of performance and results. This research investigates into determinants/factors affecting the integration and identifies essential ingredients and self-assessment criteria for facilitating the total quality management (TQM)/performance measurement (PM) practices in organisations.

Area 3. Innovation and New Product Development

How to enhance the innovation capability and improve the success rate of forms (particularly small and medium-

sized enterprises (SMEs) in technology transfer has become a critical issue in both the academy and practice. This research is two-fold: it investigates the relevancy of the collaborative approach to innovation and technology transfer in SMEs and 2) is geared toward the development of generic self-assessment model for SMEs to determine their performance in Innovation and new product development (NPD) practices.

I also engaged in two collaborative research projects with overseas scholars and researchers. One was concerned with "Strategy Formulation and Performance Measurement in Manufacturing Enterprises" (with City University of Hong Kong and Middlesex University, England; Completed in 2009), and the latter is an on-going project on "Writing an Industrial Engineering Text/Case Books", (with City University of Hong Kong and The Hong Kong Polytechnic University).

Domalapally Rao

Professor - Structural Engineering
Department of Civil & Environmental Engineering



D S Prakash Rao was a Professor of Structural Engineering with the Department of Civil and Environmental Engineering at UWI, St. Augustine. He had over forty years of research, design and teaching in countries such as India, Germany and Australia and had been involved with projects on a wide range of topics such as bridge analysis and design, model testing, pre-stressed concrete, live load surveys, software development, concrete technology, high-rise buildings, earthquake engineering and non-destructive testing. Professor Rao has published widely, and authored a handbook on the design of bridge deck slabs, a professional book on detailing of reinforcement, four textbooks on strength of materials and structural analysis, and a technical monograph on durability of concrete structures. He is the recipient of several awards. The following are summaries of several areas of his research profile.

1 Design temperature distributions and thermal stresses in concrete bridges

The research project dealt with thermal stresses in

concrete bridges due to insolation (solar radiation) effects. These stresses, not usually considered in the design of bridges, induced distress in several structures. Concrete bridges are constantly exposed to the ambient environment, and subjected to alternate heating and cooling cycles. The ambient conditions (temperature, solar radiation and wind velocity) induce thermal gradients in the bridge superstructure, leading to additional stresses over the cross section, besides longitudinal movements and vertical deflections. Temperature distributions and the resulting stresses have been investigated in several countries including U. K., America, Australia and New Zealand; the reported investigations in other countries are scanty.

His investigations led to the development of design temperature distributions for concrete bridges of various configurations for the ambient data in Melbourne, Australia and in New Delhi, India and the stresses induced in various configurations of concrete highway bridges were assessed. A comprehensive document on the major computer programs developed on these aspects were also prepared.



2 Assessing the seismic response of structures by monitoring low amplitude ambient vibration characteristics

Earthquakes that devastated various regions of India in the expected (Bhuj, 2001) as well as unexpected regions (Latur, 1993) caused extensive loss of property and human life.

The project envisaged the review of existing procedures for seismic analysis, and the development of guidelines for seismic resistant structures. It also involved monitoring of the low amplitude ambient vibrations of structures, and comparing the response with various analytical models. The study leads to the formulation of rational seismic resistant design procedures and structural configurations.

3 Performance assessment and non-destructive testing of concrete structures

Non-destructive testing (NDT) is an integral part of structural performance evaluation. Periodic inspection and maintenance of structures is essential to ensure long service life of structures. It is also necessary to establish the reasons for deterioration of the structure before planning its repair program. Quality control, routine inspection as well diagnostic investigations require the application of NDT techniques judiciously for evaluation and effective implementation of control measures.

NDT yields a rapid assessment of the existing condition of the structure. However, no single NDT technique yields data on complete structural performance; usually two or more techniques have to be adopted for correct evaluation and diagnosis of structural deficiencies. It is also essential to study the structural drawings and construction records, as well as the existing structure in order to correlate the data of various NDT techniques. Often in situ studies have to be

confirmed by laboratory testing and correlation with similar data. The project involved the procurement of the equipment, extensive evaluation in the laboratory, and training of technicians, students and professional engineers in various methods of testing. While the emphasis was on the applications, the limitations of the methods were also appraised.

4 Seismic resistant design of reinforced concrete framed structures

The failure of reinforced concrete structures in recent earthquakes in several countries has caused concern about the performance of concrete structures, especially of the beam-column joints. The performance of framed structures depends not only upon the individual structural elements but also upon the integrity of the joints. In most of the cases, joints of framed structures are subjected to the most critical loading under seismic conditions. The reversal of forces in beam-column joints during earthquakes may cause distress and often failure, when not designed and detailed properly. The design and detailing of joints play a crucial role in providing ductility and strength required to sustain large deformations and reversed stresses during earthquakes.

Some of the common incorrect design and construction practices of beam-column joints are appraised along with possible remedies. Various types of joints, their behavior under lateral forces are discussed along with the experimental results. The behaviour of various types of joints was assessed, along with the design and detailing aspects. An equation, applicable to both normal strength and high strength concretes, for calculating the area of transverse reinforcement in the joint was proposed based on recent research. The procedure for the design of various types of joints was also formulated.



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PUBLICATIONS

D. S. Prakash Rao, 2002. *Introduction to Strength of Materials*. University Press Limited, Hyderabad, India 2002, p.162

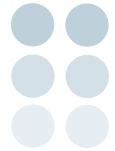
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D. S. Prakash Rao, 1986. Temperature distributions and stresses in concrete bridges, *Journal of the American Concrete Institute*, Vol. 83. No 4 July- August 1986, pp588-596

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Renewable Energy with Energy Security:

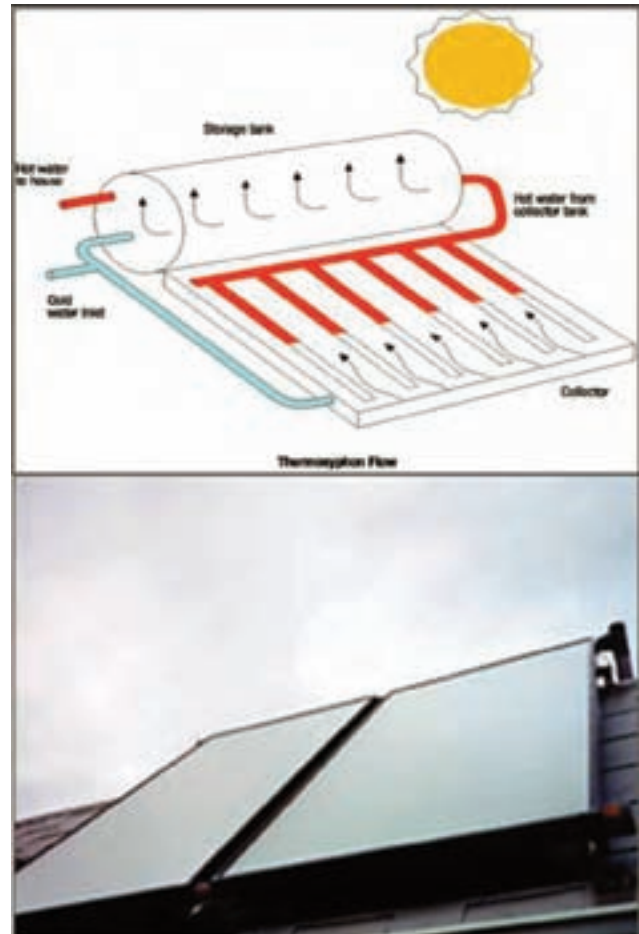
The Introduction of RE Portfolio Standard in the Economies of the Caribbean Island Chain

The common thread of the last five Summits of the Americas was to enhance energy security amongst the member states while at the same time encouraging the development of a common policy framework for renewable energy (RE).

RE has been advocated as a method for reducing the dependence on imported energy and a necessary requirement for the reduction of the carbon footprint of countries, most of which are signatories to the Kyoto protocol. The Caribbean is particularly susceptible to the effects of global warming as most of the population live close to the sea and hence would be the first to feel the effect of the predicted rise in the sea level. The Caribbean Islands, with the exception of Trinidad, are very dependent on tourism. However, with the expected temperature changes due to global climate change, the Caribbean Island chain will be devastated as most islands would lose their most valuable tourist asset, their sandy beaches. The predicament of the islands is further exacerbated by the fact that they have no control of the predicted sea level rise as their aggregated anthropogenic green house gas (GHG) emissions are less than 0.2% of global value.

With the introduction of international legal instruments such as the United Nations Framework Convention on Climate Change and the Kyoto Protocol there has been an international push to combat climate change by committing countries to a reduction in GHG levels.

Additionally, this commitment has been driven by a desire to reduce pollution and increase energy security in the face of highly variable fossil fuel prices. One



approach to GHG emissions reduction has been legislating renewable energy (RE) portfolio standards, which require nations to meet a certain percentage of their power generation demands through the use of energy derived from natural, sustainable energy sources such as solar, wind, geothermal, biomass and ocean currents.

There are many common technical and economic barriers to the introduction of RE technology to the



Caribbean Islands. Trinidad and Tobago is peculiar in that it has an economy that is heavily based on an energy sector that is driven by the country's abundant fossil fuel resources. This strong hydro-carbon economy and a population of a little over 1 million has resulted in Trinidad and Tobago being one of the highest GHG emitting countries in the world, on a per capita basis (quite insignificant on an actual value basis). Furthermore, unlike some of its Caribbean neighbours, there has been little in the way of implementation of RE technology in the country. This perhaps makes Trinidad and Tobago ideal for an examination of the benefits, drawbacks and barriers to the introduction of RE technologies and the lessons learnt can then be expanded to the more tourist dependant islands of the Caribbean.

In an effort to introduce a sustainable RE portfolio, the Caribbean islands must each establish an environment that is most suited to the introduction of solar and wind power generation for that country. The governments must know a priori, the effect of RE introduction on the power system before a portfolio standard can be articulated. Hence the necessary power system studies must be commissioned as one of the first steps.

It should be remembered that both wind and solar sources are intermittent in nature and hence require 100 per cent back-up in these island states. What

this means is that the unit cost of electricity from these RE technologies is not just the RE technology cost but the inclusion of the back-up cost as well.

In addition, solar and wind atlases for each island must be developed so that there is a proper mapping of the available RE resource. No investment should be made before these two fundamental steps are done.

The financial and policy measures that would have to be taken by the government in order to introduce RE technologies would certainly open the government to criticism and opposition. However, a gradual approach, supported by an aggressive public awareness campaign would probably help mitigate this. This approach would first entail focusing on the most easily achieved GHG reducing method as well as energy efficiency and conservation measures that would receive the least resistance.

At the same time support must be provided to the research on and building of the infrastructure necessary for RE development to become feasible. This would put the Caribbean on the sustainable path to making a significant impact on its emissions.

The savings achieved would help offset the cost to consumers of implementing RE technology.

In the long run, it would help wean the islands away from total dependence on fossil fuels and move to one that is sustainable and renewable.



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Bonnie J. Tyler

Professor - Biomaterials; Surface Chemistry
Department of Chemical Engineering



Bonnie Tyler is a Professor in the Department of Chemical Engineering at UWI, St. Augustine Campus. Her research deals with the chemical processes that occur at organic and biological interfaces including medical implants, biofilms, foods and atmospheric particles.

Her special strengths lie in applied mathematics including multivariate data analysis and the mathematics of non-destructive depth profiling. Importantly, she has developed algorithms for calculating depth profiles from angle dependent ESCA data sets for and for processing 2D and 3D TOF-SIMS images. Recently, she

organised an international workshop in this field: Surface chemical analysis: Improving data interpretation by multivariate and informatics techniques. The conference was held in Trinidad at the Salybia resort and included scientists from Europe, Asia and North America.

Since Professor Tyler's approaches to data analysis are applicable to a wide range of areas, this accounts for her involvement in projects ranging from the recalcitrance of biofilm infections to the study of the chemistry of fossil fuels.



Her earlier publications between 1997 and 2006 include the following:

Khot, P. D.; Suci, P. A.; Miller, R. L.; Nelson, R. D.; Tyler, B. J., A small subpopulation of blastospores in candida albicans biofilms exhibit resistance to amphotericin B associated with differential regulation of ergosterol and beta-1,6-glucan pathway genes. *Antimicrob Agents Chemother* **2006**, 50 (11), 3708-16.

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Tyler, B. J.; Rayal, G.; Castner, D. G., Multivariate analysis strategies for processing ToF-SIMS images of biomaterials. *Biomaterials* **2007**, 28 (15), 2412-23.

Faculty of Medical Sciences



The Faculty of Medical Sciences (FMS) is comprised of the Schools of Medicine, Dentistry, Veterinary Medicine, Pharmacy, and Advanced Nursing Education. The five schools working under the umbrella of “One Health” provide unique opportunities for multi- and interdisciplinary research and has resulted in a wide spectrum of research activities, ranging from studies on cardiovascular disease, diabetes, dengue and the development of vaccines against canine leptospirosis, to investigations into the links between mental illness and migration, the dental health of the people with special needs, and approaches to medical education. Synergies created through collaborations within the Faculty are further enhanced by links with other UWI Faculties and with regional and international institutions.

Lifestyle-related and other chronic conditions

The School of Medicine has a strong focus on lifestyle-related and other chronic conditions, in particular those that are increasing in incidence due to economic globalisation, demographic change, and dietary/behavioural changes associated with westernisation, examples of which include obesity, cardiovascular disease, diabetes and asthma.

On-going research by graduate students within the Department of Preclinical Sciences with international partners, seeks to understand metabolic derangements that occur during chronic consumption of a high carbohydrate diet, associated with risk for type 2 diabetes. The effects of high calorie intake on the brain and possible links to Alzheimer’s and Parkinson’s disease are also under investigation.

Other work on the mechanisms of action of mitochondrial enzymes is also relevant to our understanding of Alzheimer’s disease and myocardial infarction.

Role of ethnicity in determining disease susceptibility

In addition to investigating the biochemical and molecular mechanisms underlying non-communicable diseases (NCD), FMS researchers have helped to clarify their epidemiology in Trinidad and Tobago and the wider Caribbean. In many cases there are apparent differences in disease expression or prevalence between ethnic groups.

As such several studies have attempted to clarify the role of ethnicity in determining disease susceptibility. For example, by the Department of Preclinical Sciences



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together with international collaborators showed that the high prevalence of type-2 diabetes among Trinidadians of South Asian ancestry could not be accounted for by differences in the genetic architecture and that many of the alleles known to be associated with NCD were not clustered in a particular ethnic group in Trinidad. Data from other work suggested a role for dietary patterns in the aetiology of type-2 diabetes among men of South Asian ancestry.

An ongoing study is addressing the hypothesis that ethnicity is a significant determinant in the embryonic response to changes in cellular environment, and accounts, in part, for the variation in incidence and in the development of NCD. Other studies led by the Department of Paraclinical Sciences investigated the effect of ethnicity on the expression of clinical diseases such as asthma



and dengue virus infection. Another aimed at molecular definition of racial admixture in the diverse Trinidadian population should facilitate such investigations.

Asthma and other allergic disorders are also of growing concern to the region. In this respect, researchers in the Department of Paraclinical Sciences conducted a survey of allergic asthma, rhinitis and eczema among over 8,000 school-aged children in Trinidad and Tobago, which has contributed to the International Study of Asthma and Allergy in Childhood.

In addition, the department was a key player in a multi-institutional collaboration on the potential health impact of Saharan dust clouds on Caribbean populations. One aspect on Sahara dust and asthma in Trinidad caught the attention of National Geographic and was featured on “Strange Days on Planet Earth.”

Prevention, surveillance and management of NCD

There has also been a strong emphasis on approaches to prevention, surveillance and management of NCD. The Faculty has been involved in several national surveys of the nutritional status of the general population. There have also been community-based interventions to reduce disease burden, resulting in generation of data that can inform regional policy makers. FMS researchers are also working with partners in academia, government, teachers, parents and children to infuse the primary school curriculum with health

and nutrition education in order to promote healthy lifestyle behaviours and reduce obesity among school-aged children.

The Faculty is also a key player in the Regional Non-Communicable Diseases Surveillance System, an initiative that is meant to improve the region’s capacity to deliver cost-effective health services associated with NCD.

Also, a diabetes surveillance study funded by the Helen Bhagwansingh Diabetes Research & Prevention Institute (DERPI) has screened over 66,000 primary and secondary school students for diabetes.

In terms of chronic disease management, work led by the Department of Paraclinical Sciences has shown that type 2 diabetic patients at primary care settings in Trinidad and Tobago have poor glycaemic control. A follow-up study on self blood glucose monitoring has demonstrated the benefits of empowering patients to take the management and care of their blood glucose levels out of the laboratories to their own homes.

Mental health and neuroscience

Several FMS researchers are involved in studies on mental health and neuroscience. In addition to investigations into Parkinson’s and Alzheimer’s disease, there has been considerable work on neuronal injury and neuroprotection, dementia, depression, phobia, and substance abuse.

The theme of ethnicity and health recurs here, as

investigators have studied the question of whether ethnic variation in genes involved in alcohol metabolism explains differences in the incidence of alcoholism.

Other work led by the Psychiatry Unit in the Dept of Clinical Medical Sciences identified family history, substance use, unemployment, and African ethnicity as risk factors for schizophrenia. The association between migration and increased rates of mental illness has also been extensively studied.

Infectious Diseases of Animals and Humans

An important FMS research theme is Infectious Diseases of Animals and Humans. These include HIV-AIDS, dengue and other emerging and re-emerging diseases such as Leptospirosis, Yellow fever and other mosquito-borne diseases, drug resistant bacterial infections (including hospital acquired infections), food-borne diseases, sexually transmitted diseases such as Chlamydia and human papilloma virus associated cervical cancer, and animal infections of public health importance. As most emerging infections in humans are caused by animal pathogens that

become established in human populations, close collaboration between researchers in the School of Medicine and the School of Veterinary Medicine has been key to successful research efforts in these areas.

There has been considerable work on ecological and evolutionary factors that determine pathogen emergence, dispersal and maintenance led by researchers in the Department of Preclinical Sciences using a phylogenetic and computation biology approach.

Animal health and disease

Researchers in the School for Veterinary Medicine have supported other studies of human disease involving animal models and the use of animals as environmental sentinels. The agouti in particular has been closely studied with a view to development as a model animal as well as to facilitate reproduction in captivity.

While they contribute to studies of human disease, the primary interest of researchers in the School of Veterinary Medicine is animal health and disease,



whether companion animals, livestock or free-living and captive wild animals. They focus on understanding the epidemiology, pathology, diagnosis and treatment of infectious and non-communicable diseases of animals, and contribute to veterinary public health.

Epidemiology, public health and health promotion

Research work centred on epidemiology, public health and health promotion emanates from all schools and include studies on management of HIV-AIDS, caregiver burden and dementia, the health and socioeconomic position of the aged, evaluation of health monitoring protocols, development of parameter norms for the regional population, oral health needs in young children, dental health education, oral health promotion, and dental health of people with special needs.

The School of Advanced Nursing Education has examined the customer services attributes of nursing

in an attempt to improve customer satisfaction at health care facilities. Research includes studies on patients' expectation and level of satisfaction with nursing performance, preparation of nursing students for effective clinical practice and teacher's perception of school nurses in selected schools.

Other research includes knowledge, attitude and practices of primary school teachers in relation to potential HIV-positive students.

The School of Pharmacy has been involved in the development of new drug delivery systems and research in the pharmacy business field.

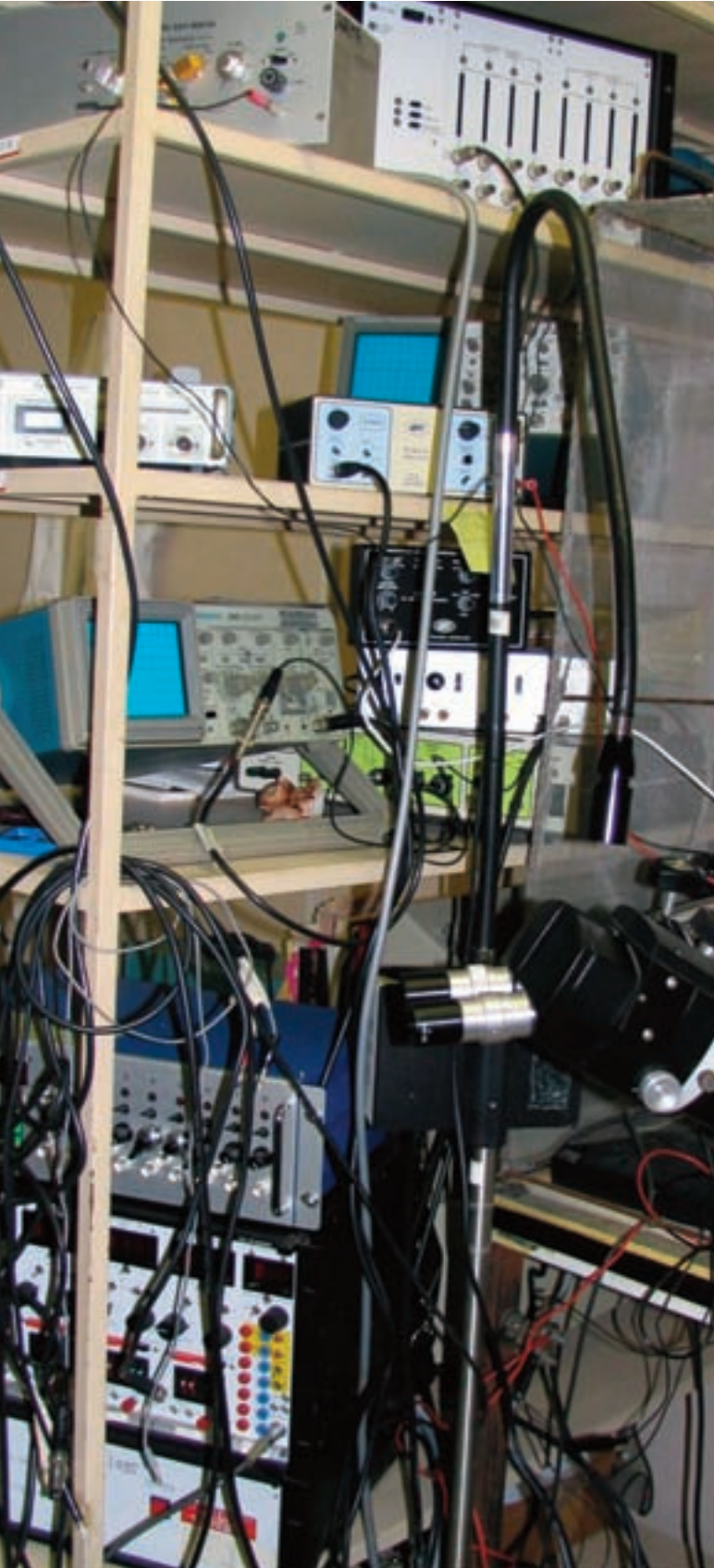
Past studies include an evaluation of patient-perceived adverse effects of Tamoxifen by breast cancer patients, complementary and alternative therapies used at medical practices and non-prescription drugs used by hypertensive people and potential clinical risks.

The use of natural products (herbal medicine) in the treatment of wound healing, cancer, hypertension, epilepsy, peptic ulcer, and cardiovascular disease is also an area of particular interest.



Jonas Addae

Professor - Physiology
Head, Department of Pre-Clinical Sciences



Part of the laboratory set up for recording electrical activity of nerves in the brain.

The role of glutamic acid receptors in protection against neurological diseases

The work of the British pharmacologist Henry Dale and the German physiologist Otto Loewi in the 1930s provided sufficient evidence that nerves communicate with each other in the brain by releasing chemicals that move across a synapse—the small space between two nerves. Acetyl choline and noradrenaline were known quite early to be examples of such chemical messengers, which became known as neurotransmitters. Glutamic acid (or glutamate) is one of the twenty naturally occurring amino acids that are linked together in human cells to synthesize proteins for numerous biochemical processes.

Although the early work by V.B. Brooks, R.E. Ransmeier & R.W. Gerard and by T. Hayashi in the 1940s and 1950s had demonstrated that application of glutamate to the brain caused excitation and increased electrical activity of nerves, glutamate was considered to be too widespread in the brain to be a possible neurotransmitter. The systematic work by D.R. Curtis, J.W. Phillis and J.C. Watkins in the late 1950s to the early 1980s paved the way for the understanding of glutamate as a neurotransmitter in the brain.

Currently, glutamate is known to be one of the most common neurotransmitters found in the brain and spinal cord; it is used by nerves in the processing of sensations from the outside world (e.g. vision, hearing, taste, and smell); and skin sensations (e.g. pain and touch). Glutamate is involved in processing muscle movements e.g. walking, running, and skilled movements. The chemical also plays a major part in memory formation in different parts of the brain.

Paradoxically, glutamate is also involved in several neurological and psychiatric disorders e.g. epilepsy, migraine, stroke, motor neuron disease, Parkinson's disease, Alzheimer's disease, schizophrenia and substance abuse. These neurological and psychiatric disorders are classified as "chronic non-communicable diseases", a topic that forms part of UWI's Faculty of Medical Sciences research themes.

The question that has intrigued me over the years and formed the basis of my research is "How does a chemical that plays such crucial roles in several normal brain functions also be a major culprit in such a wide array of brain diseases?" Needless to indicate that, given the wide range of actions of glutamate in physiological (normal) and pathological (abnormal) processes, there are several laboratories worldwide that have

been studying the actions of glutamate from different perspectives.

When glutamate is released by a nerve, it acts on four main types of proteins (known as receptors) to effect changes in other nerves. My research work (which has been in very close collaboration with Trevor Stone of Glasgow University) has focused on the actions and interactions between two of the glutamate receptors known as NMDA and AMPA.

In a series of experiments spanning two decades we have shown that:

- In the cerebral cortex, nerves initiate steps that make them resistant to the effects of continued activation of the NMDA receptor by glutamate. Of the four glutamate receptors, the NMDA receptor is the main one that mediates the damage to nerves. Hence, this finding indicates that there are intrinsic mechanisms that can protect nerves against the harmful effects of glutamate.
- Mild stimulation of AMPA receptors by glutamate prevents the effects of subsequent stimulation of NMDA receptors, without interfering with normal communication between nerves. AMPA receptors tend to mediate most of the normal brain functions; hence, our finding indicates that such functions could limit the chances of nerve damage via the NMDA receptor.
- As a follow up to the above observation, stimulation of AMPA receptors in nerves protects nerves against epilepsy and spreading depression, the latter is involved in migraine and stroke.
- In the hippocampus, a part of the brain known to be crucially involved in memory formation, inducing Long-term potentiation (an experimental model of memory formation) protects

nerves against subsequent damage from lack of oxygen or subsequent intense stimulation of nerves by glutamate-related compound. This observation could provide a biological explanation for the known protective effect of learning against dementia.

- Mild stimulation of nerves with glutamate-related compounds protects nerves against the harmful effects of a subsequent more intense exposure to the compounds; a process that has been termed preconditioning. This finding supports the emerging understanding that nerves in the brain can activate protective mechanisms against subsequent damage by glutamate.

The results of our work have demonstrated that although glutamate is both a friend and foe to nerves of the brain, there are intrinsic brain mechanisms that protect it from the harmful effects of glutamate. Understanding these mechanisms is essential to controlling the harmful effects of glutamate without compromising its widespread essential normal functions in the brain and spinal cord. The alternative approach of blocking glutamate receptors has had limited success because such an approach has been accompanied by serious side effects from the simultaneous blocking of normal brain functions.

We are currently examining how glutamate receptor activation interacts with other neurotransmitters in the brain e.g. GABA and adenosine, to increase its protective actions; and how the location of glutamate receptors on the nerve influences its physiological versus pathological effects. Additionally, we are examining how extracts of locally available foods (e.g. curcumin) and plants (e.g. jasmine and neem) could protect a person against some of the diseases listed above by affecting the glutamate receptor.



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Addae, J. I., Evans, S. M., Ali, N., & Stone, T. W. (2000). NMDA-induced changes in a cortical network in vivo are prevented by AMPA. *Brain Research* 869, 211-215.

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Abiodun Adesiyun

Professor - Public Health/Epidemiology
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Professor Abiodun Adesiyun assumed duties at the School of Veterinary Medicine, Faculty of Medical Sciences, University of the West Indies, St. Augustine Campus on October 30, 1990 as Senior Lecturer in Veterinary Public Health/Epidemiology. He was promoted to the rank of a full professor on February 11, 1999. Since joining the UWI, he has published a total of 105 peer-reviewed papers, presented 56 papers at local, regional and international conferences, and served as supervisor to three Ph.D. and eight M.Phil. students, all of whom have successfully completed their theses.

In July 1999, he was a recipient of the University of the West Indies Vice Chancellor's award for Excellence in the Area of Research for the academic year 1998/1999, to date the only award recipient in that area in the Faculty of Medical Sciences. In April 2008, he was selected as one of the UWI's 60 leading academics (60 under 60) as part of the 60th Anniversary Celebrations.

Since 1990, he has individually or jointly attracted research grants worth TT\$2,344,868.70 (US\$372,201.38):

- UWI Campus Research grants (TT\$538,648.80 or US\$ 85,499.81),
- Dean's Awards for Research (TT\$140,000 or US\$22,222.22),
- Trinidad and Tobago Government Research Grant (TT\$1,107,700 or US\$175,825.39),
- regional sources (TT\$177,095 or US\$281,110.32)
- international sources (TT\$381,419.94 or US\$60,542.85).

Prior to the establishment of the School of Veterinary Medicine in 1989, there was a dearth of scientific information in veterinary medicine in the country. His major areas of research therefore, focussed on identifying the important aetiological agents (bacterial, viral and parasitic) responsible for diarrhoea in livestock in the country, which resulted in the publication of nine papers in peer-reviewed journals; epidemiology of subclinical and clinical

mastitis in cattle and bacteriological and toxicological risks posed to consumers of milk (18 papers); enteropathogens of farmed and free-roaming wildlife (9 papers); food safety relevant to ready-to-eat foods of animal origin (30 papers), zoonoses due to bacterial and viral agents (16 papers).

During this period, two problems arose, firstly, the outbreak of brucellosis in cattle and water buffalo farms in the country in 1998 and secondly, there were reports of dogs properly vaccinated against leptospirosis succumbing to the disease. With the introduction of a test and slaughter policy by the government to eradicate brucellosis in the country the water buffalo (buffalypso) population faced a threat of extinction considering the fact that close to 75 per cent of the animals in herds were seropositive for brucellosis. An extensive investigation was conducted to assess the efficacy of B. abortus RB51 vaccine, which had been successfully used in the American bison and cattle.

The studies conducted by three of his graduate students (one Ph.D. and two M. Phil.) and which produced nine full-length papers in peer-reviewed journals provided invaluable information on the efficacy of the vaccine.

Professor Adesiyun has also carried out valuable research on morbidity and mortality due to leptospirosis in vaccinated dogs, which has revealed that imported vaccines were not effective in protecting vaccinated dogs. Studies in rats, suspected cases of canine leptospirosis and stray dogs established that the predominant serovars of *Leptospira* in the country were quite different from those in the vaccines used locally. Vaccine trials in hamsters using killed vaccines produced from the two prevalent serovars were determined to be significantly more effective than both commercial vaccines used locally. Studies are underway to confirm these findings in Beagle dogs. As a result of the series of studies, he has one Ph.D. student under his supervision and has produced five publications.



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Andrew Adogwa

Professor - Anatomy

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Over the years, I have undertaken studies singly as well as collaboratively in the areas of neuroanatomy and neuropathology. I have also conducted extensive studies on the gross and microanatomy of the brain of domestic animals with special emphasis on the structure of the brainstem.

In the brainstem the nerve cell bodies are arranged in groups traversed by nerve fibres giving the appearance of a web of nerve fibres within which the groups of nerve cells are dispersed. The groups of nerve cells are referred to as nuclei. The study of cell types that form the nucleus is referred to as cytoarchitecture.

Understanding the cytoarchitecture of the brainstem is vital to the understanding of the manifestations of certain disorders of the nervous system. Studies of the organisation of these nuclei in normal animals (neuroanatomy) as well as in animals that manifest nervous system disorders (neuropathology) have been a major preoccupation of mine for several years.

Knowledge of the nuclei is helpful in understanding the behaviour of animals.

Other research work includes the brainstem of echolocating bats in Trinidad. My research interest was in the structures of the respiratory system that enable the bats to produce sounds as well as the parts of the brain that enable the bat to have an acute sense of hearing. At present, the research focus is on the cytoarchitecture of the brainstem nuclei of the auditory pathway of these echolocating bats. These studies are undertaken to contribute to the understanding of echolocation.

Another area of interest is neurodegeneration. Many diseases belong to a group known as neurodegenerative diseases. Examples of these diseases are: Alzheimer's, Parkinson's and mad cow diseases. Copper deficiency causes neurodegeneration in animals and is of serious economic importance to livestock farmers, both large and small. Copper deficiency causes a nervous disease in lambs and kids characterised by in-coordination of



the hind limbs. This condition is known as swayback disease and presents itself in two forms: congenital and delayed. The congenital form is characterised by stillbirth or by animals showing in-coordination soon after. In the delayed form the young animals show signs of the disease within the first six months of birth. This disease is endemic in Trinidad.

Extensive studies of the soils and plants in Trinidad showed that the soil is deficient in copper. The neuropathological evaluation of the brains of animals that are afflicted with the disease characterised by in-coordination confirmed the occurrence of swayback in Trinidad.

I have conducted collaborative research on neuropathology of the brains of animals affected by swayback in Trinidad. Pathological studies of the cerebral cortex, cerebellum and spinal cord were done.

In order to further understand the degenerative changes that occur in swayback disease, biochemical studies were undertaken in collaboration with the biochemistry unit at the Faculty of Medical Sciences. Graduate students were involved in biochemical studies centred on cytochrome oxidase. Cytochrome oxidase was reported to be deficient in some of the neurodegenerative diseases. Accordingly, biochemical studies were carried out on the brain and liver mitochondria to evaluate the level of cytochrome oxidase. These studies showed that as in Alzheimer's and Parkinson's diseases in man, cytochrome oxidase displays reduced activity in swayback disease. Animal models of these diseases are useful to study these diseases and their treatment, and about other neurodegenerative diseases in general.

Research in this area produced rabbit models of this disease, which we believe may be beneficial in the study of Alzheimer's disease.

Another aspect of the study of swayback disease was the relationship between parasitism, copper deficiency and swayback. Our experiments in this regard showed that animals with high endopar-

asitic infestation had low copper levels in their blood compared with animals that had low parasite load. Worm infestation appears to be a major factor in the precipitation of this disease. Animals that had copper supplementation in their diets also were coming down with the disease and this led to a next level of the research. Proper deworming may hold the key to swayback problems in Trinidad. Research in this area is ongoing as well.

Another area of research interest is congenital malformations. These are abnormalities found in animals at birth and in human beings. They have several different causes; some are sporadic as a result of developmental defects. A great many occur as a result of environmental pollution.

Over the years, I have collected, characterised and documented congenital abnormalities in animals in different parts of Trinidad. This research is ongoing.

Another major area of research that was undertaken with Dr. Gary Garcia in livestock science is in the anatomy of wildlife species in Trinidad, mainly the anatomy of the agouti. Agouti is an important meat source in Trinidad and wider Caribbean. Agouti has the potential for large-scale production and domestication, which depends on knowledge of these animals. Some farmers are already growing agouti for sale. They need the support of scientific information that can help to improve the production of these animals.

Postgraduate students have been involved in studies on various aspects of agouti. Extensive work has been carried out on the anatomy of the male reproductive system of the agouti, including semen evaluation and storage, on the female reproductive system and gross and histological studies of the digestive system of the agouti.

Some of this information is necessary for veterinarians who will provide health care for these animals when large-scale production becomes a reality and will be extended to other wildlife.



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Zulaika Ali

Professor - Child Health Neonatology
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The over 1,000 sick newborn babies who are admitted annually to the Neonatal Intensive Care Unit (NICU) are the genesis of much of Professor Ali's research over the past years. In 1981 Dr. Ali assumed the post of Lecturer in Child Health (Neonatology) at the NICU, at the Mount Hope Women's Hospital (MHW) and remained the only Consultant neonatologist on call for the next 17 years except when she was out of the country. In the absence of a suitable handbook on neonatal medicine in the developing world and due to the rapid change in junior medical staff on the Unit, Dr. Ali published *Medical Care of the Newborn* in 1987 and a second edition in 1994. She contributed four chapters in a PAHO publication entitled *Manual of Perinatal Care for the Caribbean*, PAHO/WHO, 1996, which was used as a clinical guide for neonatal care in developing countries.

Perinatal Research

Dr. Ali carried out research that accurately documented major neonatal conditions seen in the NICU and drew attention to important public health conditions such as an outbreak of congenital rubella, which resulted in a nation-wide immunisation programme involving teenage girls and women in the reproductive age group against rubella, and an increase in congenital syphilis due to an increase in the prevalence of sexually transmitted diseases

that were undiagnosed and untreated. This resulted in an improved surveillance system. She demonstrated that group B streptococcal infection was a major cause of mortality in the newborn and drew attention to the importance of nosocomial (hospital-acquired) infection at the Mt. Hope Women's Hospital. Her research identified perinatal infection, asphyxia, respiratory diseases, prematurity and jaundice as major causes of newborn morbidity and mortality in Trinidad.

Foetal Programming

Several research projects were undertaken to better understand maternal factors associated with poor foetal growth and to gain insight into possible interventions to optimise foetal growth. This research is directly related to the hypothesis that foetal undernutrition leads to disproportionate foetal growth and programmes the individual to later develop chronic non-communicable diseases (CNCN). It addresses the possible root causes of CNCNs [diabetes, heart disease, high blood pressure] and may suggest ways for primary prevention of these diseases.

In studies of newborns and their mothers, 5-L-oxoproline was found to be an indirect marker for foetal growth. In lipid studies in mothers and their babies there was an impaired ability to increase plasma triacylglyceride (TAG) during late gestation in Trinidadian women, women with



low plasma levels of arachidonic acid (AA) and docosahexaenoic acid (DHA) during gestation gave birth to infants with lower levels of AA and DHA (and vice versa). In anthropometric studies in women of different ethnicities, compared to Afro-Trinidadians, Indo-Trinidadians had lower pre-pregnant weight and body mass index at 34-36 weeks, lighter infants and lower ponderal index. Shorter lighter mothers had lighter babies, shorter infants were born to mothers with the lowest pregnancy weight gain. There were positive correlations between birth weight and maternal triceps and subscapular skin fold thickness. Macro-somic babies ($\geq 4,000$ grams) showed a tendency to have lower systolic blood pressures (bps) than lighter babies at five and ten years of age. This may support the hypothesis that infants born small have higher bps in adolescence and adulthood.

Research in HIV/AIDS

As part of the UWI Response Programme against HIV/AIDS, Professor Ali spear-headed research focused on infusing HIV/AIDS content into curricula of all faculties on the St. Augustine Campus and presented their results in five papers at the International AIDS conference in Bangkok, Thailand, 2004. She also led a team that conducted a national baseline survey of knowledge, attitudes, practice and beliefs in HIV/AIDS in 18-49-year-olds in 2007/8 for the National AIDS Coordinating Committee.

Operational research: Medical education

In order to assist the Ministry of Health to roll out its programme of treatment, care and support for those infected and affected with HIV, Professor Ali planned and implemented the Trinidad and Tobago Health Training Centre (TTHTC) with offices at both the Faculty of Medical Sciences and the San Fernando General Hospital. These training sites are equipped with videoconferencing facilities.

Since it was launched in June 2007, TTHTC has trained over 900 health care

workers (doctors, nurses, pharmacists, social workers and dietitians) in HIV/AIDS and other conditions. Our experiences with the TTHTC have been presented at scientific meetings locally, regionally and internationally.

Operational Research: Telemedicine

In 2004, Professor Ali established the UWI Telehealth Programme, which enables real time videoconference consultations with specialists at the SickKids Hospital, Toronto for children with conditions that cannot be diagnosed or treated in Trinidad and whose families cannot afford treatment abroad. The mission of the UWI Telehealth Programme is "Improving access to high quality health care, by integrating telehealth into the standard health care delivery system and enhancing information sharing and collaboration with specialist health care centers abroad."

In its sixth year of existence the programme has assisted 159 families, has held over 100 clinical consultations and 12 babies have received free complex surgeries in Canada. There was a significant cost saving to the country. In addition there was training for 10 lecturers, 12 dentists and 295 other health care professionals.

This model is being used by the Sick Kids Hospital International Programme and regional paediatricians to develop a programme for capacity building in paediatric oncology for the Caribbean with UWI Telehealth as the focal point. Our experiences have been presented at scientific meetings locally and internationally. Professor Ali is the Director of the Programme.

Ongoing research

Research is continuing in the following areas: prevalence of reported maternal illicit substance use, markers for early detection of perinatal infection, the relationship between insulin resistance in early pregnancy and the occurrence of gestational diabetes and pre-eclampsia.

A new research area is in learner-centred design of health oriented distance learning courses.



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Chidum E. Ezenwaka

Professor - Chemical Pathology
Department of Para-Clinical Sciences



Research interest - Diabetes mellitus

Diabetes mellitus is a metabolic chronic disease and it is well known that **environmental** and **genetic** risk factors are involved. Over the years my research has focused in the area of diabetes. My contributions to scientific knowledge in diabetes have been documented and disseminated through publications in reputable scientific journals and presentations at learned scientific conferences and public seminars. These could be summarised under three areas:

• Causes of diabetes

Barnett and colleagues in a study of 200 pairs of identical twins provided the scientific evidence that established the genetic basis of type 2 diabetes. My contribution in this area of diabetes research was through a study on Nigerian offspring of diabetic patients on the early metabolic defects that contribute to the development of diabetes.

When I joined the University of the West Indies, I continued this research on offspring of Trinidad patients with type-2 diabetes. The project, known as "offspring study," employed both individualised exercise and diet counselling (lifestyle intervention) and annual laboratory tests in prospective assessment of the risk of developing diabetes in the offspring. Thus, similar to being the first

African author to report on early metabolic defects in offspring of African diabetic patients, my laboratory at UWI was the first in the Caribbean to identify insulin resistance and early defective insulin secretion as risk factors for developing diabetes in offspring of Trinidadian type-2 diabetic patients.

Of greater significance however, was the identification of increased aggregation of biochemical risk factors for the metabolic syndrome in offspring of Trinidadian diabetic patients. Indeed, this finding, which was published in the *Scandinavian Journal of Clinical and Laboratory Investigation* became the first documented evidence of the risk of the metabolic syndrome in Caribbean subjects with positive family history of diabetes.

The Volkswagen Foundation of Germany graciously provided the needed funding to advance the offspring study to molecular level. During the 30 months (Oct. 2002 - Mar. 2005) collaboration with German partners, we reported, for the first time in the Caribbean, that the offspring of type-2 diabetic patients had a low concentration of newly identified adipose tissue protein, adiponectin. My laboratory was the first in the Caribbean to provide evidence that the presence of the gene mutation (E23K variant) in the offspring of type-2 diabetic patients does not increase their glucose intolerance. This finding was significant because it caused temporary

redirection of my interest from molecular biology studies to lifestyle modification studies for preventing diabetes.

•Diabetes prevention

The study employing exercise, diet counselling and laboratory assessment continued for the following five years, identifying obesity (body weight) and insulin resistance as two major factors that contributed to the development of diabetes and impaired glucose tolerance in one and five offspring respectively. Four years after our report on non-diabetic offspring of diabetic patients, others in The Netherlands confirmed obesity as the "best lone predictor for undiagnosed diabetes."

•Prevention of diabetes complications

On September 15, 2006, at a national symposium on chronic non-communicable diseases, it was recognised that people with diabetes easily develop cardiovascular diseases because of poor blood glucose control. Although I had advocated for improved blood glucose management strategies in diabetic patients in Trinidad, I was convinced that investigation on the dietary pattern of patients at the primary care settings would provide further insight into the cause(s) of the reported poor blood glucose control. Thus, my laboratory investigated the level of diabetes health education amongst the primary care patients and concluded that one of the causes of the reported poor blood glucose control was poor local dietary education or prescription.

The idea of investigating the diet-related cause of poor blood glucose control among type-2 diabetic patients was thus conceived. The results of the first part of the study identified rice, roti and bread as the three most regularly consumed carbohydrate foods. We subsequently assessed the contributions of each of the above identified foods to poor blood glucose control by allowing each patient volunteer to ingest 75 grams equivalent measures of these foods at seven-day intervals. We monitored their blood insulin and glucose responses

over the period. Our finding, which was reported in the *Clinical Nutrition* journal, showed, for the first time, that patients who consumed roti regularly had the risk of having higher after-meal blood glucose levels than patients who consumed either bread or rice on regular basis. Because this finding was well received at a conference presentation and public seminars, a press release was published in *Sunday Guardian* of 11th June 2006 (p.12).

In 2006, my research group (website: <http://ezenwaka.webs.com/>) expanded our research interest on cardiovascular risk profile of diabetic patients to Tobago. Subsequently, we identified for the first time that abdominal obesity (or upper body obesity) is the major culprit responsible for the high prevalence rates of the metabolic syndrome in type-2 diabetic patients in Tobago and Trinidad. Another significant finding from the project, was the comparatively higher ten-year coronary heart disease risk prediction for diabetic patients of East Indian origin. It is significant to note that the results of the study showed that self-monitoring of blood glucose in type-2 diabetic patients significantly improved their blood glucose control and coronary heart disease risk profile. Our finding suggests that type-2 diabetic patients will potentially benefit from inclusion of glucose meters and test-strips in their health-care package.

Current Research study

Based on the above finding that demonstrated that self-monitoring of blood glucose in type-2 diabetic patients significantly improved their blood glucose control and coronary heart disease risk profile and considering that an approximated 5000 diabetic patients in Trinidad and Tobago own glucose meters for home monitoring of blood glucose levels, we are currently assessing self-intervention practices for optimal blood glucose control among diabetic patients involved in self-monitoring of blood glucose in Trinidad and Tobago.



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Gerard Hutchinson

Professor - Psychiatry
Head of Department, Clinical Medical Sciences



I am a graduate of the University of the West Indies at undergraduate (1987) and post graduate levels (1993) and completed my Diploma in Psychiatry in 1990 and Doctor of Medicine in Psychiatry in 1993. After internship, I worked at the Psychiatry Unit, General Hospital, Port-of-Spain for two years, then at the St. Ann's Hospital. During that time my first major article, a survey of suicide cases by poisoning, was published in the *West Indian Medical Journal* in 1991. That study began my research interest in suicide.

From 1994, I worked as a Registrar at The Maudsley Hospital in London, England, arguably the most famous psychiatric hospital in the world, and began doing research at the Institute of Psychiatry, the leading research centre for psychiatry in Europe. There I developed an interest in psychosis primarily because of the high rates of this disorder presenting

in patients of Caribbean and African origin in Britain. I also began working in Developmental Psychiatry focusing on Attention Deficit Disorders and learning disability.

At the institute, I published several papers including two that were significant in changing the prevailing notion that there must be a biological or genetic reason for the excess rates of psychosis.

The 1996 paper argued that the morbid risk of psychotic illness was greater in second rather than in first generation migrants. The 1997 paper proved that the Caribbean population did not have an increased rate of pregnancy and birth complications and therefore this could not be responsible for the reported high rates of psychotic illness as researchers had suggested.

This finding led to a major multi-site grant from the Medical Research Council in Britain. I was appointed



to coordinate the research at the London patient recruitment site in 1997 and also completed my Certificate of Training in NeuroPsychiatry that year. The London site at the Institute of Psychiatry (IOP) was the nerve centre of the project, which was entitled AESOP–Aetiology of Schizophrenia and Other Psychoses.

In 1998, I became a Clinical Lecturer in Psychiatry at the IOP and Kings College Medical School, doing undergraduate lecturing to medical students alongside my research and already a well recognised researcher in the area of psychosis, I presented at conferences in Spain, Switzerland, Germany and the United States.

In 1999 I joined the University of the West Indies as a Senior Lecturer in Psychiatry at have remained here since except for a hiatus in 2000- 2001 when I returned to London to attend the London School of Hygiene and Tropical Medicine to complete my MSc in Epidemiology as part of a Wellcome Fellowship.

I also obtained a Diploma from the London School, which led to a successful grant to study psychosis in the Trinidad setting in 2002- 2004. The results of that work showed that cannabis use was the major precipitant of first episode psychotic illness in Trinidad. Presenting these results at international conferences led to a resurgence in work about cannabis use as a precursor to psychotic illness.

I completed my Masters of Philosophy in Psychiatry in 2004 comparing the work in Trinidad with that from London. I maintained my research in suicide and due to the high suicide and attempted suicide rates seen in Trinidad and continued to publish on this area, joining ranks with researchers from Britain and Sri Lanka to generate a consortium on the use of pesticides as suicidal agents.

I was promoted to Professor in Psychiatry in 2006, the first national of Trinidad and Tobago to hold this post. In 2006, I started the M.Sc in Clinical

Psychology at the St Augustine Campus under the Psychiatry Unit where I am the Unit Leader since 2001. This programme has been quite successful, graduating over 40 students since its inception with another 40 students at varying stages of completion. It is being undertaken with support from the University of Birmingham and we aim to introduce the PhD programme with their support this year 2011.

The Psychiatry Unit under my leadership has continued to train psychiatrists in the DM programme and now has the largest number of registered students—22 among all postgraduate programmes in the Faculty of Medical Sciences.

I was appointed as Head of the Department of Clinical Medical Sciences in 2008, a post I currently hold. I now have over 90 peer reviewed publications and book chapters including the most recent in the *Principles of Social Psychiatry* (2010).

I engage with colleagues at the University of Toronto, Mc Gill University in Canada and Harvard University in the United States. My collaborations with the Institute of Psychiatry continue and we have applied to the Wellcome Trust for a grant in 2011 to conduct an international multicentre research project with sites in India, Africa, England and Trinidad and Tobago.

I work closely with the Department of Psychiatry at UWI, Mona most notably with the Professor of Psychiatry Frederick Hickling.

In terms of public service I have served as Consultant to the Office of the DPP in Trinidad and St. Vincent, developed counselling services for NIHERST and now COSTAAT where I serve as Consultant for the provision of services. I pioneered the development of a full psychiatric service at the Eric Williams Medical Services Complex in Mount Hope and am now the head of the psychiatric services at the North Central Regional Health Authority.



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Amanda McRae

Professor - Human Anatomy
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What is so fascinating about a piece of tissue weighing 1.3 kilos, which, is squishy, wrinkled, walnut shaped and looks like something that washed up on the beach. From the Stone Age to present day this seemingly unremarkable structure has been a centerpiece of amazement. Its structure, function and internal mysteries beckon for discovery. Thus it is not astounding that theories, facts and even fiction have generated a body of literature, which probably encircles the globe several times. In spite of this extensive literature more awaits to be unveiled. Yes, the human brain has sparked imagination, creativity, critical thinking and debate for centuries, and continues to do so. What or how is possible that one structure has consistently remained the centerpiece of curiosity for centuries. Possibly because the "Human brain are us". This is the structure which defines our being as it is responsible for our intellect, thoughts, relations, dreams, decisions and much more. Its damage has devastating outcomes.

The brain casts a net in the pathway of investigators enticing them to unveil its mysteries. The brain entangled me in its net of wonderment in the mid 70s.

After the completion of my PhD, my career branched off to develop a novel therapy for Parkinson's disease and to establish a biomarker for Alzheimer's disease. Serendipity and cherished collaborations have enabled rewarding results in these areas.

The arrival of antibodies, which could be used to recognise brain structures, revolutionised this field. These antibodies introduced some new techniques and their application to study of the brain; one being immunocytochemistry and the other Western Blots. These techniques allowed specific antigens to be visualised within the brain as well as to quantify their modification. The production of antibodies directed against small neurotransmitter molecules such as dopamine, noreadrenalin, serotonin, GABA and acetylcholine were viewed as major contributions. The technology involved linking small neurotransmitters to a large protein thus rendering these small molecules immunogenic.

Having learned immunocytochemistry, I spent a year with the investigator to assist him test his antibodies. Based on the technology used to produce them we began to produce some wild hypothesis. We wondered if similar processes of making antibodies could be taking place in the brains of people with neurodegenerative disorders such as Parkinson's disease and Alzheimer's. Both of these disorders result in the neurodegeneration of neurons, which synthesize dopamine in the case of Parkinson's disease or acetylcholine in Alzheimer's disease. We considered that during neurodegeneration abnormal proteins could be produced and thus trigger an immune response thereby producing antibodies directed either against healthy neurons. This was like an

The use of the microscope is a major part of my research. This is a slide where brains have been immunostained with antibodies from the serum of an Alzheimer's disease patient.



vited book chapters. One of our first accomplishments was to test blood samples for the presence of the microglia antibodies. We successfully established that the antibody in a blood sample has the same potential as what we found with cerebrospinal fluid that being the ability to differential diagnose dementias. At present, the antibody is determined immunocytochemically using perinatal rat brain as the substrate. This would not be preferred means to diagnose Alzheimer's disease in a clinical setting. Thus we are collaborating with a group of scientists trying to identify the antigen recognised by the microglia antibody to develop an ELISA (an enzyme linked immunosorbent assay test) for blood that would be clinically attractive and could lead to the development of commercial diagnostic kits to identify patients with Alzheimer's disease.

We are currently pursuing other research projects including determining cognitive impairment in diabetics, establishing the prevalence of dementia in senior activity centres and geriatric homes in Trinidad and Tobago, determining caregiver burden in people caring for patients with dementia and conducting community based prevalence studies of dementia in a well defined catchment areas. For these investigations we use the following screening tools: Mini Mental State Examination (MMSE), Community Screening Instrument for Dementia (CSID), Consortium to Establish a Registry for Alzheimer's Disease (CERAD) Word List Learning Test and Recall, and Clock Drawing Test (CDT). Zarit Caregiver Burden Scale (ZCBS). This is indeed a cherished collaboration and we continue to advance as our dedicated focus is to understand age-related disorders and their consequences on society in Trinidad and Tobago.

By the end of my PhD headlines aired the news around the world that brain transplants in rodents were being conducted in Sweden and held great promise as a cure for Parkinson's disease. There was much controversy surrounding these brain transplants as they depended on fetal brain tissue. If this were to be performed in humans it would raise all sorts of ethical issues. My former boss had been responsible for designing a process known as microencapsulation using microspheres composed of biodegradable polymers. These allowed the microencapsulation of any agent, which could be implanted in the form of injectable microspheres. The advantage was that the microencapsulated product could be slowly released for weeks, months or even years. During a visit to Alabama I happened to meet him and during a conversation one thing led to the next and both of us came to conclusion that mi-



Neurodegenerative disorders: We use rodent models to investigate human neurodegenerative disorders. These type of investigations have led to major to major breakthroughs in the design of therapies and to advance the understanding of disease processes.

croencapsulated dopamine would provide a suitable substitute for fetal tissue. This was successfully carried out and we demonstrated that injecting microspheres containing microencapsulated dopamine into Parkinsonian rats had the same functional benefits as fetal tissue. Moreover these microspheres induced fibre growth. An appreciated grant from CHRC has allowed this work to continue at the Faculty of Medical Sciences. Results obtained at the Faculty of Medical Sciences continue to support that the implantation of dopamine microspheres have the potential to serve as therapy for Parkinson's disease.

We continue to examine the role of inflammation in the brain with new approaches established at the Faculty of Medical Sciences. A single injection of lipopolysaccharide (LPS) induces dopamine (DA) cell death in the substantia nigra through an inflammatory mediated pathway. This brain area is involved in Parkinson's disease. Firstly, we have used this agent to investigate means to protect the dopamine neurons from inflammation. Our results have shown that a favourable means to protect the brain from inflammation is to reduce the intake of calories. On the other side we are also interested in learning about agents, which provoke brain inflammation. A high intake of calories is generally considered to provoke peripheral inflammation and could have consequences on the brain. We selected to investigate the influence of a high intake of calories in the presence of a low-grade inflammation, which was induced by diluting the normal dose of lipopolysaccharide. Our findings indicate the addition of a sucrose solution to the diet accelerates inflammation and provokes a greater destruction to the dopamine neurons. Thus diet in combination with a minor inflammation in dopamine neurons, which could occur in the early stages of Parkinson's disease could provoke a neurodegenerative cascade of events leading to an accelerated pathological state.

*I am of the opinion that the brain exercises the
greatest power in the man*

Hippocrates

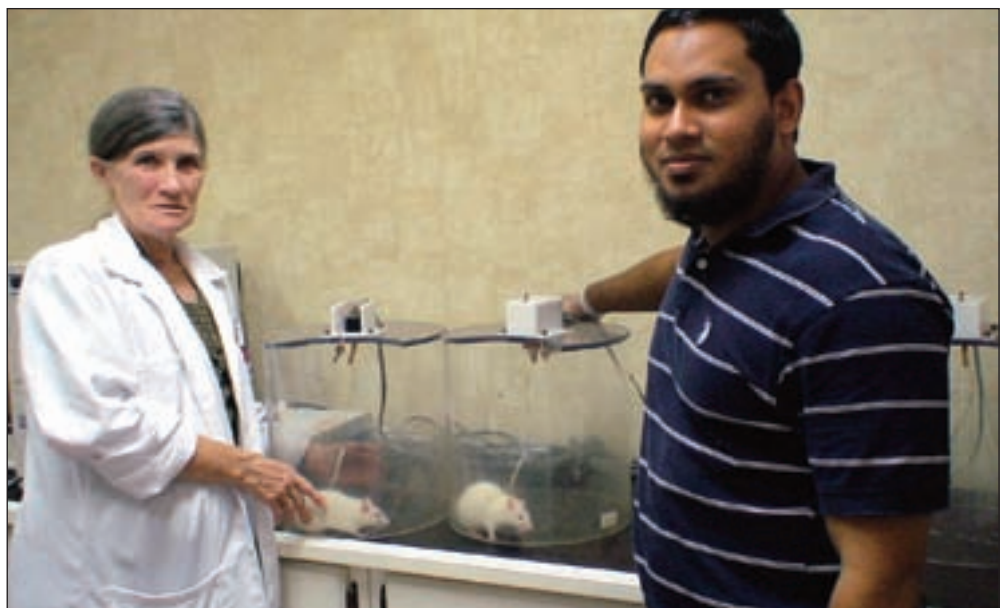
On the Sacred Disease (Fourth century BC)



Members of DARTT conduct lively discussions: From left Drs. Nelleen Baboolal M.B.,B.S, DIP. PSYCH., D.M. PSYCH (Lecturer in Psychiatry, Department of Clinical Medical Sciences, Faculty of Medical Sciences), Gershwin Davis M.B.,B.S, PhD (Lecturer in Chemical Pathology, Department of Paraclinical Sciences, Faculty of Medical Sciences) and Professor Amanda McRae PhD (Professor of Anatomy, Department of Preclinical Sciences, Faculty of Medical Sciences).

**Monitoring the behaviour
of Parkinsonian rats:**

Rats with experimental Parkinson's disease are monitored in a computerised rotational chamber. Therapeutic benefit from the implantation of dopamine microspheres can be appreciated by this apparatus. To be internationally competitive it is important that our experiments use research approved rat strains. For this reason we purchased and maintain a colony of Sprague Dawley rats.



Research Assistant Kimberley Assam administers tests to a patient and a caregiver.



Imparting knowledge is a significant role for an investigator. Ashton Rogers uses a cryostat to section brains to prepare for immunocytochemistry. A new degree programme at UWI offers a Mphil/ PhD in neuroscience. Ashton Rogers will be the first recipient of a PhD in Neuroscience.

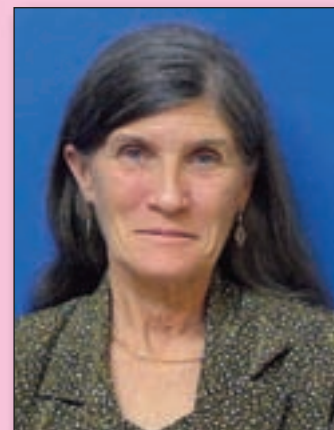
autoimmune response. As fate would have it while attending a conference an Italian group presented their work showing that something in the serum from Parkinson's disease patients killed cultured dopamine neurons. Could this substance be an antibody? One thing missing was to test this hypothesis. An opportunity to test the presence of antibodies in the cerebrospinal fluid of Parkinson's disease patients became available in Sweden.

We trembled with excitement when the results clearly demonstrated that indeed there was an antibody in Parkinson's disease cerebrospinal fluid, which recognised dopamine neurons. We were a bit early with these results. In the mid 80s the dogma was that the brain was an immunological privileged zone and this did not leave room for consideration about immune responses and neurodegeneration. However the dogma of an immunological privileged brain was quickly falling apart since across the globe in Canada Professor Patrick McGeer had successfully indentified the microglia as the immune cell of the brain. Thus a new era for the brain was dawning as now immunological processes were quickly being associated with the pathogenesis of neurodegenerative disorders such as Alzheimer's disease and Parkinson's disease. More important microglia were being shown to have an early participation in the pathogenesis of Alzheimer and Parkinson's disease. Thus the fact that microglia participated in the disease process was an indication that inflammation was indeed an integral part of the neurodegenerative process. This opened consideration for immunotherapy as well as attempting to monitor the disease pro-

gression using immune related biomarkers.

Our research with antibodies continued its course and had been expanded to include people with Alzheimer's disease. Based on our initial hypothesis we had expected to find antibodies directed against acetylcholine. However much to our surprise we found that Alzheimer's disease cerebrospinal fluid contained antibodies directed against the microglia cell. This was indeed amazing as this was the same immune cell that was considered initiate neurodegeneration in Alzheimer's disease. Further research indicated that the antibody has diagnostic potential as it is present at a much greater frequency in the Alzheimer's disease compared to aged matched healthy seniors as well as persons with other forms of dementia. Thus we turned our focus on developing this antibody as a biomarker in particular for the early detection of Alzheimer's disease. We had indications that this could be case as it was present in people two years before they were clinically diagnosed with Alzheimer's disease.

In Trinidad this work has continued to flourish. An important aspect of research is a team effort. This is one of the attractions the field of neuroscience has—it has become a virtual melting pot of expertise, which enhances the advancement of knowledge about the brain and its mechanisms in health and disease. Thus it is indeed rewarding to be a team member with Drs. Nelleen Baboolal and Gershwin Davis. We have successfully formed a company Dementia Research Awareness of Trinidad and Tobago (DARTT). Our steadfast collaboration has resulted in research, numerous publications, conference presentation and in-



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Paluri Murti

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Research interests

Professor Murti began his career in 1973 as a full-time researcher of the Basic Dental Research Unit & International Reference Center of the World Health Organization (WHO) for Oral Cancer and Precancerous

Lesions and Conditions in India, at the Tata Institute of Fundamental Research Bombay (now Mumbai), which subsequently became the WHO Collaborating Center for Oral Cancer Prevention.

As a member of the multidisciplinary research group



he was a part of various prospective epidemiologic studies (1973-1995) conducted in rural areas of India involving over 150,000 people. In a nutshell his contribution encompasses

1. Tobacco habits in India and the global scenario.
2. Epidemiological, clinical, cytological and histological characteristics of oral cancer, precancerous lesions and conditions and other tobacco-related oral mucosal lesions.
3. Natural history of oral precancer with focus on clinical and histological aspects associated with malignant transformation.
4. Behavioural modification of tobacco use.
5. Primary and secondary prevention of oral cancer.
6. Influence of micronutrients and other components in oral cancer and precancer.
7. Characterisation of oncogenes in oral cancer and precancer.
8. Role of flow cytometry in the early detection of oral cancer.
9. Role of immunocytochemistry as a risk marker for oral precancer.

Research applications to humanity

His work led to the understanding of many disease processes in regard to types of tobacco habits—its association with the etiology, pathogenesis, and malignant potential of various oral precancerous lesions/conditions, namely, erythroplakia, leukoplakia, submucous fibrosis and oral lichen planus, role of tumor suppressor gene in oral carcinogenesis, and early detection and prevention of oral cancer. These aspects have day-to-day clinical applications.

Research output

Professor Murti's work is widely recognised in international arena as a "gold standard". Most of the work done was the first of its kind in the world with high citation index and citations in various research volumes and text books, some

of them standard text books for the Doctor of Dental Surgery (DDS) Program.

He has 9 chapters in books, 54 publications in various journals, edited international proceedings and has been a reviewer for the WHO Blue Book.

Special expertise

- Early detection of oral cancer
- Oral and Maxillofacial Pathology/Oral Diagnosis and Oral Medicine
- Immunocytochemistry
- Oral Epidemiology
- Behavioural modification of tobacco use
- Dental Education
- Oral disease pattern in Trinidad and Tobago

Areas of current research interest

As a staff member of the UWI School of Dentistry, Professor Murti has diversified his research interests and published in Oral Oncology, Distribution of Oral Diseases Pattern in Trinidad and Tobago, Medical Problems among Dental Patients visiting the School of Dentistry.

What's on the horizon?

HIV/AIDS-related oral lesions in Trinidad and Tobago, epidemiology of oral diseases in Trinidad and Tobago

Teaching

Professor Murti teaches his specialty as a part of the Oral Disease Course in association with his colleagues for 1st year to final year DDS Program. He also teaches the in the Dental Auxiliary Training Program. He provides oral histopathology diagnostic services at the School and for referrals.

Conclusion

Prof Murti besides being a researcher is a diagnostic oral and maxillofacial pathologist, a clinician, a teacher and coordinator of the Oral Disease group at the School of Dentistry.



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PUBLICATIONS

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Vijay Naraynsingh

Professor - Surgery

Head, Department of Clinical Surgical Sciences



Professor Naraynsingh is a renowned scholar in the field of medicine. He has received numerous awards both locally and internationally including a national award in 1991: Chaconia Gold Medal. He is also a distinguished Fellow of some of the most prestigious international colleges:

- Royal College of Surgeon of Edinburgh (1978),
- International College of Surgeons 1984 and
- Royal College of Surgeons of England 2003

In addition, he has been honoured by several organisations for his long and meritorious service to Trinidad and Tobago in the field of medicine. In regard to teaching and research, he has had a significant impact on the course and direction of the graduate programming in the medical field.

Teaching and Research

The postgraduate (DM Surgery) programme was started five years ago on his recommendation and under his supervision. Professor Naraynsingh was responsible for the design of the curriculum, its topics and time-tabling. The programme offered two Postgraduate seminars per week, an Operative Surgery Session once/week, Audit Meeting once/week, Surgery Grand Rounds once/week, Clinical Case Presentations once/week, joint Surgery-Radiology Round once/week and Journal Club once/week.

In addition, a Residents Research Breakfast meeting was added on October 18th 2009 (at Paria Suites Hotel). This will take place twice per year. At this meeting, Residents present their research. To date, residents have already published nine papers in referred journals since joining the programme.

His research covers a wide range of subjects majoring in Vascular surgery, Diabetic Foot Disease and Laparoscopic Surgery in which he has generated a large number of publications. These areas of ongoing interest have increased the research output from the Department. The undergraduate teaching has undergone a few changes by updating the curriculum to include new areas such as minimally invasive surgery and the casebook has been also reviewed as at October 2008.

Publications

Professor Naraynsingh has produced 25 peer review publications in the last two years (2008- 2009); 22 have already been published and six accepted (awaiting publication).

Much work is taking place, especially since the postgraduate programme was started and he is ensuring that both Residents and Staff become actively involved in research.

Outreach

Professor Naraynsingh has done radio and television



shows in order to educate the public on common problems such as breast cancer, diabetic foot problems and vascular disease. He has also lectured to the Diabetic Association of Trinidad and Tobago and delivered the Distinguished Lecture of The University of Trinidad and Tobago on Diabetic Foot Disease.

He has lectured to the Northern Branch and Southern Branch of the Trinidad and Tobago Medical Association on several occasions and presented at their Annual Research Day. He also lectured on mammography to the Cancer Society 2008.

Regional and International Representation

In 2008, he was appointed President of the Caribbean College of Surgeons (to present). This followed years of involvement with the College—organising meetings, printing booklets, presenting papers and so on. He has also participated in regional workshops (e.g. Diabetic Foot in St. Lucia 2008) to update regional practitioners.

He is an Examiner at the Royal College

of Surgeons of England and has taken part in their postgraduate examinations. He has also been a reviewer for several medical journals and was recently put on the Editorial Board of the *International Journal of Surgery*.

Department/Administration

As Head of the Department of Clinical Surgical Sciences, Professor Narayansingh oversees a broad range of surgical units—General, Plastic, Neurosurgery, Urology, Ophthalmology, Otolaryngology, Orthopaedics, Anaesthesia, Paediatric Surgery, Obstetrics and Gynaecology.

The complexity of administration is increased as these areas are taught at four separate centres—Port- of-Spain General Hospital, San Fernando General Hospital, Sangre Grande County Hospital. Despite the obvious difficulties in running such a department, he has managed to work with academic, administrative, technical and support staff to ensure that the department functions efficiently. He continues to serve the department and the Faculty on several committees.



VIJAY NARAYNSINGH

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PUBLICATIONS

Dan D, Harnanan D, Gooden K, Seetahal S, Hariharan S, Narayansingh V, "Laparoscopic splenectomy in a minimal resource setting: a case series from the Caribbean". *Surg Laparosc Endosc Percutan Tech*. 2010 Jun; 20 (3): e125-8

Maharaj R, Narayansingh V, Shukla P.J, "Management of nonparasitic Hepatic Cysts (Letter). *J Am Coll Surg* 2010 Jun, 210 (6): 1015

Naraynsingh V, Teelucksingh S, "Neuropath Ulceration" *New England Journal of Medicine* 362;9 March 2010

Narayansingh V, Dan D, Hariharan S, Shukla P.J, Maharaj R, Bile Duct Surgery without T-Tubes" *Indian Journal of Surgery* August 2009



Lexley Pinto Pereira

Professor

Department of Para-Clinical Sciences



The respiratory system has attracted my attention due to its ability to cause severe distress of breathlessness to afflicted patients and then in total submission to drug therapy promptly exhibit dramatic symptom relief. In basic pharmacology these effects are easily attributable to the manipulation of a particular entity in the human lung called a β (beta) receptor.

My PhD. research described the clinical assay of drugs that could block the β receptor in the heart and in fact one of these became favoured in the armamentarium to treat high blood pressure. But because a β (beta) receptor in the lung was also blocked, asthma came forward as a significant clinical side-effect in these patients. That finding nurtured an interest in the management of asthma, which is responsive (maybe submissive!) to stimulation of the β receptor in the lung.

Shortly after obtaining a lectureship position at the UWI in 1991, I reviewed the physiology of this elusive receptor in the lung and explored drug utilisation in asthmatic patients who were receiving specialist care

in Trinidad.

Despite taking treatment, it was interesting to observe some contributory reasons for which patients failed to show a clinical response from asthma medications prescribed for them. These comprised erroneous prescriptions, patients had a poor understanding of the medications they were using and flawed techniques of inhaling their drugs.

These findings encouraged us to make recommendations for regular education for patients, their prescribers and their caregivers. Educational interventions, an important tool for good disease management, can assist in eradicating inaccurate opinions patients have about their treatments. After developing the first issue of the Caribbean guidelines for Asthma Prevention and Management examination of therapy utilisation in accordance with the guidelines in specialist care clinics, it revealed surprising and informative results emphasising patient education is essential for disease control and compliance with treatment.

Asthma exerts a considerable burden on children, and childhood asthma has a high prevalence in the West Indies. An imperative factor in treatment is to know what brings on acute asthma. Research exploring this aspect in children identified predictors of repeated emergency room visits of children.

A very common problem caregivers reported was acute asthma developing close on the heels of the common cold, so we looked for the association of the common cold virus in children visiting the emergency room. One third of children with acute asthma harbour the common cold virus, which is irrespective of a seasonal influence. The strong linkage between viral upper respiratory tract infection, and allergic rhinitis with asthma, indicates they are possible sequel or likely triggers for acute asthma. Studying the prevalence of allergic rhinitis in asthmatic children and the asthma-related health burden revealed approximately half of these children suffer from allergic rhinitis, have increased emergency room visits, absence from school, and frequent day and night-time symptoms.

These studies demonstrated asthma co-exists with other diseases or is erroneously diagnosed. Chronic obstructive pulmonary disease (COPD), another obstructive respiratory illness, less frequently prevalent, is likely missed by medical practitioners in favour of asthma. Patients diagnosed with asthma in specialist care confirmed that COPD is indeed missed for asthma, throwing open the possibility that other disease entities co-exist with asthma, confounding its diagnosis and management.





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PUBLICATIONS

Pinto Pereira L M, Orrett F A and Balbirsingh, M. Physiological perspectives of therapy in bronchial hyperreactivity. *Canadian Journal of Anaesthesia*, 1996, 43:7, 700-713

Pinto Pereira L M, Clement Y, Simeon D. Educational Intervention for Correct Pressurised Metered Dose Inhaler Technique in Trinidadian Patients with Asthma *Patient Education and Counseling*, 2001; 42: 91-97

Pinto Pereira LM, Bartholomew LA, Brooks H, Lowe D, Rocke K, Rolle S, Smith J, Thekwini O, Seemungal TA, Bekele I. Chronic obstructive pulmonary disease is missed in asthmatics in specialty care in Trinidad, West Indies. *Int J Tuberc Lung Dis*. 2007 Sep;11(9):1026-32.

Sedentary lifestyle, an industrialisation fall-out with rising prevalence in Caribbean countries poses a major challenge to prevention of obesity and chronic respiratory disease like COPD and asthma. New interest in inflammatory mechanisms relevant to visceral obesity, insulin resistance, and the metabolic syndrome in the asthmatic patient, suggests the inflammatory nature of insulin resistance may contribute to asthma in obesity. This changing pattern linking respiratory and metabolic disease by the common thread of inflammation inspired collaborative research with colleagues in Medicine to explore a common marker (hs-CRP) of inflammation in these conditions and COPD. Initial findings showed that lung function is not optimal in West Indian diabetics and it correlates negatively with age, body mass index, waist circumference, chronic dyslipidaemia, hs-CRP status and acanthosis nigricans (a clinical marker of diabetes mellitus).

This association with the metabolic family of diseases kindled interest in Diabetes, one of the killer chronic non-communicable diseases (CNCDS) in Trinidad urging guideline based examination of disease management in Trinidad and the Caribbean. Exploiting drug therapy of diabetes to address other endocrine disorders seemed a natural follow up on this new allied interest.

My early flirtation with the beta receptor in the cardio-vascular system and then in the lung, to its role in therapeutic application in the treatment of asthma has been a winding road. The path led to allied respiratory disease and has now settled on co-morbid metabolic conditions associated with respiratory disease. Clearly as more information comes forth there will be fewer obligations to continue in my mainstream area of interest, which will diversify and be dictated by emerging findings in allied fields of clinical medicine and therapeutics.

Phyllis Pitt-Miller

Professor (retired)





Professor Phyllis Pitt-Miller joined the University of the West Indies in 1976 as the first Lecturer in Anaesthesia and Intensive Care at the St. Augustine Campus in the days when the Medical Faculty was known as the Eastern Caribbean Medical Scheme based at the Port-of-Spain General Hospital.

She held both the position of Academic and Departmental Head of Anaesthesia from 1982-1994 at the Port-of-Spain General Hospital. She acted as adviser to the Task Force setting up the Eric Williams Medical Sciences Complex and when the facility was opened and Patient Services started she was appointed Head, Department of Anaesthetics and Intensive Care at the Eric Williams Medical Sciences Complex from 1992-1998 moving the Academic Unit from Port-of-Spain to EWMSC in 1992.

She started the post graduate programmes in Anesthesia and graduated over 50 Diplomas in Anesthesia (DA) and up to five Doctorates in Anesthesia (DM Anesthesia) many of whom now hold Specialists Anesthetic posts in all five Regional Health Authorities.

She was appointed Dean of the Medical Faculty in 1999 and became the first female Dean of the Medical Faculty serving for eight years.

Professor Pitt-Miller was awarded the Chaconia Gold Medal for Long & Meritorious Services to Medical Education and Medicine in 1994 and appointed a Professor of Clinical Anaesthesia and Intensive Care 2003. She retired from the University in 2009.

Her main research interests involved aspects of Clinical Anaesthesia and Intensive Care with a later interest in Medical Education and her Research Papers will be grouped under Clinical Anesthesia And Intensive Care and Medical Education.

Her current research interests include gender issues in medicine and cost effective anesthesia for renal transplantation.



PHYLLIS PITT-MILLER

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PUBLICATIONS

Pitt-Miller P.: Oxytocics and their Effects on Systemic Blood Pressure During General Anaesthesia for Caesarean Section. *Caribbean Medical Journal*. 1982, 43: 9-14.

Pitt-Miller P., - Severe aplastic anaemia – complete response to antilymphocyte globulin and cyclosporin – *WIMJ* 1999; 48 (4): 238-239.

Thomas CN., Titus G, Williams D, Simeon D, Pitt-Miller P, Two-year Mortality and its determinants following acute myocardial infarction in Trinidad and Tobago – *WIMJ* 2000: 49 (2) 112-11

Pitt-Miller P, The teaching facility at the Eric Williams Medical Sciences Complex. An additional rising star from the West. *WIMJ*.200150 Suppl 4. 40-43

Dinesh Dan Ramdath

Professor – Biochemistry,
Department of Pre-Clinical Sciences



Free Radical Hypothesis of Kwashiorkor

Professor Ramdath started his graduate training at the Tropical Metabolism Research Unit, UWI, Mona Campus where his research focussed on abnormalities of micronutrient metabolism in the severely undernourished child. Working with Prof. Michael Golden the two proposed the Free Radical Hypothesis of Kwashiorkor, a common form of childhood undernutrition, which challenged the widely held misconception that this syndrome was due to protein deficiency. Some of the evidence derived from this work has influenced the WHO guidelines for the management of childhood undernutrition.

Population studies of deleterious alleles and NCD risk

Nutrition could provide the best long-term, cost-effective solution to reducing the high burden of non-communicable chronic diseases (NCD) such as type-2 diabetes, heart disease and cancer. Initial work fo-

cussed on the population prevalence of deleterious alleles associated with NCD.

These studies examined the possibility that ethnic differences in NCD may be the result of genetic predisposition. Genomic DNA was collected from the cord blood of consecutive live births at the Mt. Hope Women's Hospital. This sample (n=300) was representative of the ethnic composition of Trinidad and Tobago. In a series of publications, Prof Ramdath and his international collaborators showed that the high prevalence of type-2 diabetes among Trinidadians of South Asian ancestry could not be accounted for by differences in the genetic architecture and that many of the alleles known to be associated with NCD were not clustered in a particular ethnic group in Trinidad.

Glycaemic Index Methodology and Values of Caribbean Foods

Professor Ramdath worked with an international

group to standardise the methodology for derivation of the Glycaemic Index (GI), or the glucose raising potential, of starchy foods. Several publications were produced and these established a common and widely acceptable method for the derivation of GI of local foods that could be used to manage people with type-2 diabetes. As such, GI values for many commonly eaten Caribbean foods are now available and have been incorporated in the clinical guidelines for the management of persons with type-2 diabetes.

A collaborative study with the University of Toronto assessed the dietary GI of people in Trinidad and Tobago and showed that men of South Asian ancestry had a higher diet GI than their African counterparts. This suggests a role for dietary patterns in the aetiology of type-2 diabetes among men of South Asian ancestry.

Nutrient-gene interaction

Two studies have been facilitated by a grant from the Government of Trinidad and Tobago to establish a human tissue culture facility at the Faculty of Medical Sciences. The first seeks to understand the metabolic derangements that occur during chronic consumption of a diet comprising high amounts of carbohydrates and which is associated with risk for type-2 diabetes in humans. The second seeks to test the hypothesis that ethnicity is a significant determinant in the embryonic response to changes in cellular environment, and accounts, in part, for the variation in incidence and in the development of non-communicable diseases among ethnic groups within Trinidad.

Population Based Studies on Burden of Disease and Dietary Intakes

To assess the possibility that differences in the dietary intakes of the local population may account for the growing prevalence and ethnic patterning of NCD Ramdath has collaborated with

the Caribbean Food and Nutrition Institute (CFNI), the University of Toronto, the University of Hawaii and the University of North Carolina. With CFNI several national surveys of the nutritional status of the population as well as the existing burden of disease were assessed. Together with a graduate student (Mrs. Debbie Hilaire) and colleagues at the University of Hawaii and of North Carolina studies of the association between dietary intakes and NCD risk were pursued.

A study was conducted to obtain detailed nutrient composition data of 89 composite recipes in Trinidad from 50 people living throughout the island and a total of 359 recipes were collected. This has allowed for a more accurate estimation of the dietary intakes of Trinidadians as well as provided baseline information for the development of a specific food frequency questionnaire for use in Trinidad.

Currently, work is being pursued towards the validation of this dietary assessment tool, which would be used to determine associations between diet and NCD risk.

More recently Ramdath's work has focussed on the use of credible research evidence for the formulation of policy. He has partnered with the Caribbean Health Research Council, Pan American Health Organization, the Canadian Health Services Research Foundation and Council on Research for Development Health to define the governance structure of health research systems (NHRS) in Trinidad. The NHRS assessment produced a map of the major players involved in the production, utilisation and funding of research in Trinidad and Tobago. With this process clearly outlined it becomes easier to identify existing evidence gaps for policy formulation for governments to strengthen the governance of research production to support policy needs. This assessment tool is already in use to assess the NHRS in other Caribbean countries.



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PUBLICATIONS

Robinson S, Dawson S., Ramdath DD. Nutrition and Oral Health in HIV/AIDS. In SR Prabhu ed. HIV/AIDS in Dental Practice: An illustrated handbook for Caribbean Dental practitioners. Multi Media Centre. UWI, St. Augustine. 2006.

Golden MHN, Ramdath DD & Golden BE. Free radicals and malnutrition. In: Trace Elements, Micronutrients and Free radicals. ed. I.E. Dreosti. New Jersey. The Humana Press Inc. 1991;199-221.

Ramdath DD, Isaacs RL, Teelucksingh S, Wolever TM. Glycaemic index of selected staples commonly eaten in the Caribbean and the effects of boiling v. crushing. Br J Nutr. 2004 Jun;91(6):971-7.

Samuel Ramsewak

Professor - Obstetrics & Gynaecology
Dean, Faculty of Medical Sciences



Professor Samuel Ramsewak was appointed a Professor of Reproductive Medicine in 2002 and is presently the Dean of the Faculty of Medical Sciences. He was awarded the MD degree by thesis in 1999 from the University of the West Indies and the award of this degree was a milestone since it was the very first amongst all Campuses at this University. His dissertation was entitled Chlamydia trachomatis and Abnormal Reproductive Function in the Female. This was a study of the organism *C. trachomatis*, which is becoming increasingly recognised to be the commonest sexually transmitted disease worldwide, even surpassing gonorrhoea, syphilis and HIV. Long-term consequences include ectopic pregnancy and possibly miscarriage. Since the organism is difficult to identify, this work sought to locate Chlamydial DNA within infected tissues, such as the Fallopian tubes, the ovaries and the uterine lining (endometrium).

Together with research colleagues at the University of Sheffield, UK, he has accumulated the largest database in the research community worldwide, for Chlamydial DNA in these tissues. Based on research on this area, he has presented his findings at numerous scientific meetings including:

- *The prevalence of C. trachomatis in women with a history of miscarriage or ectopic pregnancy.* Abstract 173rd Meeting of Pathological Society of Great Britain and Ireland. Southampton UK (1996).

- *The prevalence of C. trachomatis in women presenting with ectopic pregnancy in Trinidad.* Abstract: 3rd Meeting of European Society for Chlamydial Research, Vienna, Austria (1996).

- *Molecular Methods for defining the prevalence of Chlamydia trachomatis in gynaecological patients in Trinidad.* Abstract: Joint International Post-graduate Conference of the Gynaecological and Obstetrical Society of T&T and the Royal College of Obstetricians and Gynaecologists UK. Trinidad (1997).

- *The detection of C. trachomatis in women presenting with ectopic pregnancy or infertility.* Abstract: Meeting of Federation of European Microbiological Societies, Izmir, Turkey (1997).

- *Impaired female fertility: a role for C. trachomatis.* Abstract: 175th Meeting of Pathological Society of Great Britain and Ireland. Sheffield, UK (1997).



- *Molecular methods to detect C. trachomatis in patients with ectopic pregnancy.* Abstract: 176th Meeting of Pathological Society of Great Britain and Ireland. London, UK (1998).

- *The use of molecular methods to detect Chlamydia trachomatis in patients with ectopic pregnancy or tubal factor infertility.* Abstract: 9th International Symposium on Human Chlamydial Infection, Napa, California US (1998)

Major publications in the field of Infertility:

Ramsewak S, Kumar A, Welsby R, Mowforth A, Lenton E, Cooke ID

Is analgesia required for transvaginal single-follicle aspiration in In vitro fertilisation? A double-blind study

Journal of In Vitro Fertilization and Embryo Transfer (USA) 7:103-106 (1990)

Ramsewak S, Sargeant S, Anderson E, Cooke ID

Development of a modified bivalve speculum for donor insemination

British Journal of Obstetrics & Gynaecology 97:455-456 (1990)

Li TC, Dockery P, Ramsewak S, Klentzeris L, Lenton E, Cooke ID

The variation of endometrial response to a standard hormone replacement therapy in women with premature ovarian failure. An ultrasonographic and histological study

British Journal of Obstetrics & Gynaecology 98:656-661 (1991)

Narayansingh G, Ramsewak S
Carnival and conception in Trinidad and Tobago

Fertility and Sterility (USA) 55:555-558 (1992)

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Fixation of interceed does not improve its efficacy against adhesion formation in rats.

Clinical & Experimental Obstetrics And Gynaecology (Canada) 23:147-149 (1996)

Ramsewak S, Naraynsingh A, Kuruvilla A, Duffy S

Successful pregnancy by Intracytoplasmic Sperm Injection after radiotherapy-induced azoospermia.

West Indian Medical Journal 48:240-41 (1999)

Barlow R, Cooke ID, Odukoya O, Heathley M, Jenkins J, Narayansingh G, Ramsewak S, Eley A.

The detection of *Chlamydia trachomatis* in fresh tissue specimens from patients with ectopic pregnancy or tubal factor infertility by PCR and In Situ Hybridisation (ISH).

The Journal of Medical Microbiology (UK) 50:902-908 (2001)

Eley A, Hemeg HA, Geary I, Ramsewak SS, Herring A, Caul EO.

Prevalence of *Chlamydia trachomatis* antibodies in antenatal patients from Trinidad.

SEXUALLY TRANSMITTED INFECTIONS (UK) 77:301-302 (2001)

Ramsewak S, Narayansingh G, Kuruvilla A, Naraynsingh A, Woodward B, Turner K, Duffy S, Kumar A.

Initial experiences with In-vitro Fertilisation Technology in the English-Speaking Caribbean.

West Indian Medical Journal 50: 274-77 (2001)

Ramsewak S, Sohan K.

Successful pregnancy after frozen embryo transfer.

West Indian Medical Journal 50: 339 (2001)

Sohan K, Ramsewak SS

Pleural effusion after in-vitro fertilisation: consider ovarian hyperstimulation.

West Indian Med J 53: 265 (2004)



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PUBLICATIONS

Sohan K, Woodward B, Ramsewak SS

Successful use of transrectal ultrasound for embryo transfer in obese women.

J Obstet Gynaecol 24: 839-40 (2004)

Rampersad J, Wang X, Gayadeen H, Ramsewak S, Ammons D.

In-house polymerase chain reaction for affordable and sustainable *Chlamydia trachomatis* detection in Trinidad and Tobago. *Rev Panam Salus Publica*. 2007 Nov;22(5):317-22.

Woodward BJ, Campbell KH, Ramsewak SS.

A comparison of headfirst and tailfirst microinjection of sperm at intracytoplasmic sperm injection. *Fertil Steril*. 2008 Mar;89(3):711-4.

Terence Seemungal

Professor - Adult Medicine
Department of Clinical Medical Sciences



Terence Seemungal graduated in Medicine from the University of the West Indies in 1989. He did his internship and early house officer-ship training in Trinidad and did his membership training in Birmingham, United Kingdom. In London he did research on inflammation and aetiology of chronic obstructive pulmonary disease (COPD) exacerbations leading to a PhD at the University of London. He completed his professional training in chest and general internal medicine in the North East Thames circuit where he trained at the London Chest, Royal London and University College, The Middlesex Hospitals and surrounding District General Hospitals. He then returned to Trinidad as a Senior Lecturer in Medicine at the St. Augustine Campus of the University of the West Indies and Honorary Consultant Physician at the Port of Spain General Hospital. He was subsequently elevated to the rank of Professor of Medicine where he continues his research into COPD and other chronic lung diseases.

Professor Seemungal is a Fellow of the Royal College of Physicians and Member of the British and American Thoracic Societies. Over the ten-year period ending 2009, the Thompson Reuters Science Watch survey found that Professor Seemungal was the second most highly cited author world wide in COPD research.

Seminal International Work In COPD

As a respiratory physician, the most common diseases that Professor Seemungal encounters are airways diseases. One of these, chronic obstructive pulmonary disease (COPD), is expected to be the third leading cause of death world-wide by 2020. Exacerbations of COPD are a major cause of frequent hospitalisation. In 1998 he succeeded in quantifying the frequency of COPD exacerbations when he showed that more than three exacerbations in one year predicted poor quality of life scores. He pursued the aetiology of this disease by using the polymerase chain reaction to detect respiratory viruses at COPD exacerbation and found 40 per cent of COPD exacerbations could be associated with respiratory viruses.

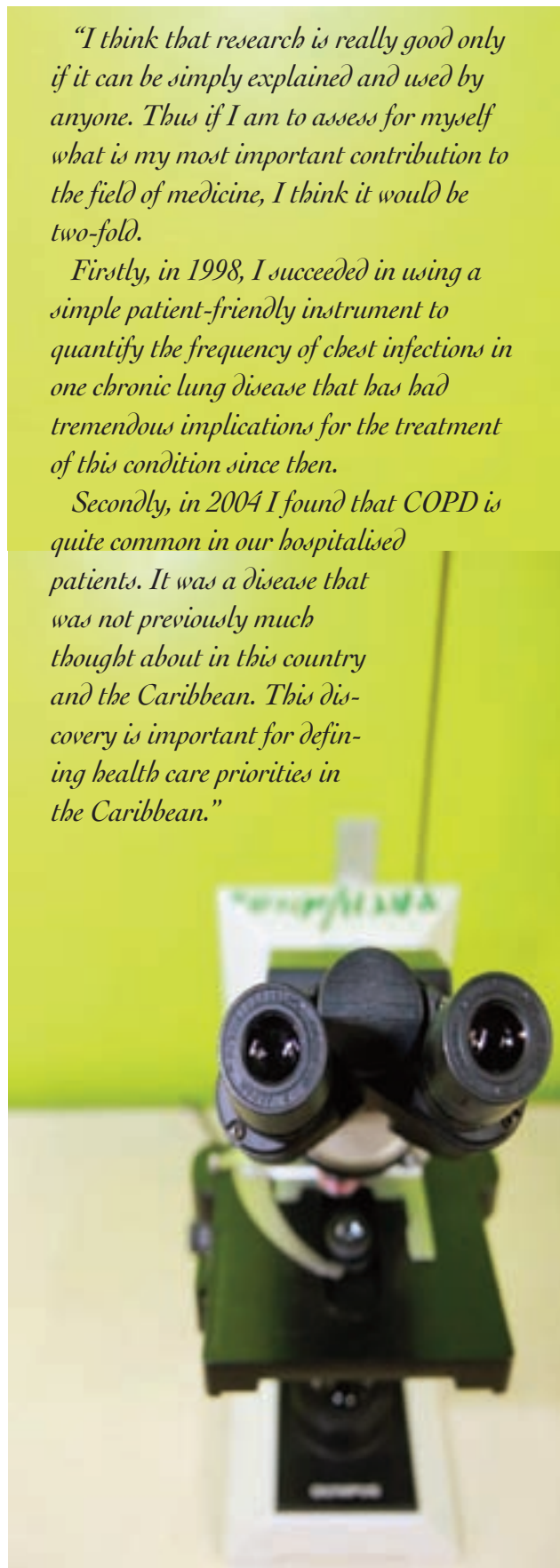
In 2008 he succeeded in finding an intervention which decreased exacerbation frequency. This was the first double blind placebo-controlled randomised study to show that regular low dose erythromycin could decrease exacerbation frequency.

From 2005 through 2009 he participated in the multicentre international comparative study (The INSPIRE Study) of two commonly used drugs for COPD patients. The study design was based on his PhD research.

"I think that research is really good only if it can be simply explained and used by anyone. Thus if I am to assess for myself what is my most important contribution to the field of medicine, I think it would be two-fold.

Firstly, in 1998, I succeeded in using a simple patient-friendly instrument to quantify the frequency of chest infections in one chronic lung disease that has had tremendous implications for the treatment of this condition since then.

Secondly, in 2004 I found that COPD is quite common in our hospitalised patients. It was a disease that was not previously much thought about in this country and the Caribbean. This discovery is important for defining health care priorities in the Caribbean."



Caribbean Work in Airways Disease

While at an international level he could study COPD exacerbations, in the Caribbean the basic epidemiology had not yet been worked out.

Thus he commenced study of COPD in the Caribbean in 2004 with the estimation of COPD prevalence within hospitalised patients because he thought that a severe disease such as this might be more easily captured within hospital. In 720 patients studied, he found 21 per cent with COPD but only three patients actually had ever heard of the disease. He then hypothesised that perhaps COPD would also be frequently found in the chronic disease clinics masquerading as asthma.

Together with his students he studied patients in the chronic disease clinics in the community where he found a similar 20 per cent of patients with COPD. In collaboration with Prof Pinto Pereira he found that 32 per cent of chest clinic patients diagnosed as asthma actually had COPD.

Thus COPD is more prevalent in Trinidad and possibly in the Caribbean than previously thought.

Airways Disease and Metabolic Syndrome

While studying the hospitalised patients with COPD he had found a link with a marker of cardiovascular disease, homocysteine. This study raised several questions about the relationship between airways disease and metabolic diseases such as diabetes.

Professor Seemungal is now part of a study of airways diseases in diabetes mellitus, which is looking at the effect of lung function on systemic inflammation in diabetics. This study has involved extensive collaboration with Professor Teelucksingh and Professor Pinto Pereira, both of whom are looking into systemic inflammatory effects of the metabolic syndrome.

Contributions in Other Areas of Lung Disease

He has recently found in a retrospective cohort study that the mortality rate for the acute chest syndrome in sickle cell disease is about three times higher than recently published averages in the USA. This has motivated research into why this has happened.

One finding was that deaths tended to occur only during our rainy season. Professor Seemungal has speculated that this may be related to the effects of respiratory viruses, which are more common during our rainy season. He is now organising a study to observe this trend more closely over the next two years. If it holds true, we may have to issue public health warnings and vaccinate sickle cell patients at the start of the rainy season. He has also studied the effects of sickle cell disease on respiratory physiology. He has found that sickle cell patients tend to have reduced FEV1 and forced vital capacity (FVC).

Contributions to the growth of teaching of Medicine in the Faculty

In response to the results of a study on the extent to which our graduates met the needs of senior stakeholders within the medical profession this study, Professor Seemungal modified the curriculum to produce the desired quality of graduates.

Contributions to the Practice of Clinical Medicine

Professor Seemungal started a chest clinic at the General Hospital, which has contributed to diagnosis and management of severe lung diseases there. Together with Dr. Rios, he has developed a spirometry service at the Hospital that has been crucial in differentiating between the various causes of respiratory diseases. The results of this study have been submitted to the quality assurance unit of the Ministry of Health with recommendations for improvement.



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PUBLICATIONS

Seemungal T, Donaldson GC, EA Paul, Bestall JC, Jeffries DJ, Wedzicha JA. Effect of exacerbation on quality of life in patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 1998; 157: 1418-22

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Keith Stevenson

Professor - Medical Education
Centre for Medical Sciences Education



I graduated with a first degree in Psychology in 1972 in the UK and shortly thereafter became a lecturer in an Adult Education College to teach Psychology.

In 1979/80 I pursued a taught Masters in the Psychology of Education at Leicester University, UK but was disappointed that most of the information was linked to primary or secondary school instruction and not on effective ways of teaching adults. In 1986 as Lecturer in Social Psychology, Open University UK (Nottingham Region), I had an opportunity to teach adults. The curriculum was based around understanding the self and how the self could be understood through behavioural sciences research. This required the students to consider what could be reliably found out from research and specifically what types of research methods yielded what type of knowledge.

My work with the Open University led me to experiment with different forms of feedback including asking students before the tutorial how they would like to be taught, and how they would not like to be taught. My findings were published (Stevenson et al 1996, 1997, 1998), fostering a future as an educational researcher.

Through teaching the Open University Course, I also became interested in how health services were

I feel that 25 years researching how university students like to learn have taught me that teachers need to be ever vigilant. Good teachers always question whether they could teach better. Being an educational researcher has allowed me to pose questions about what makes an effective teacher.

Keith Stevenson

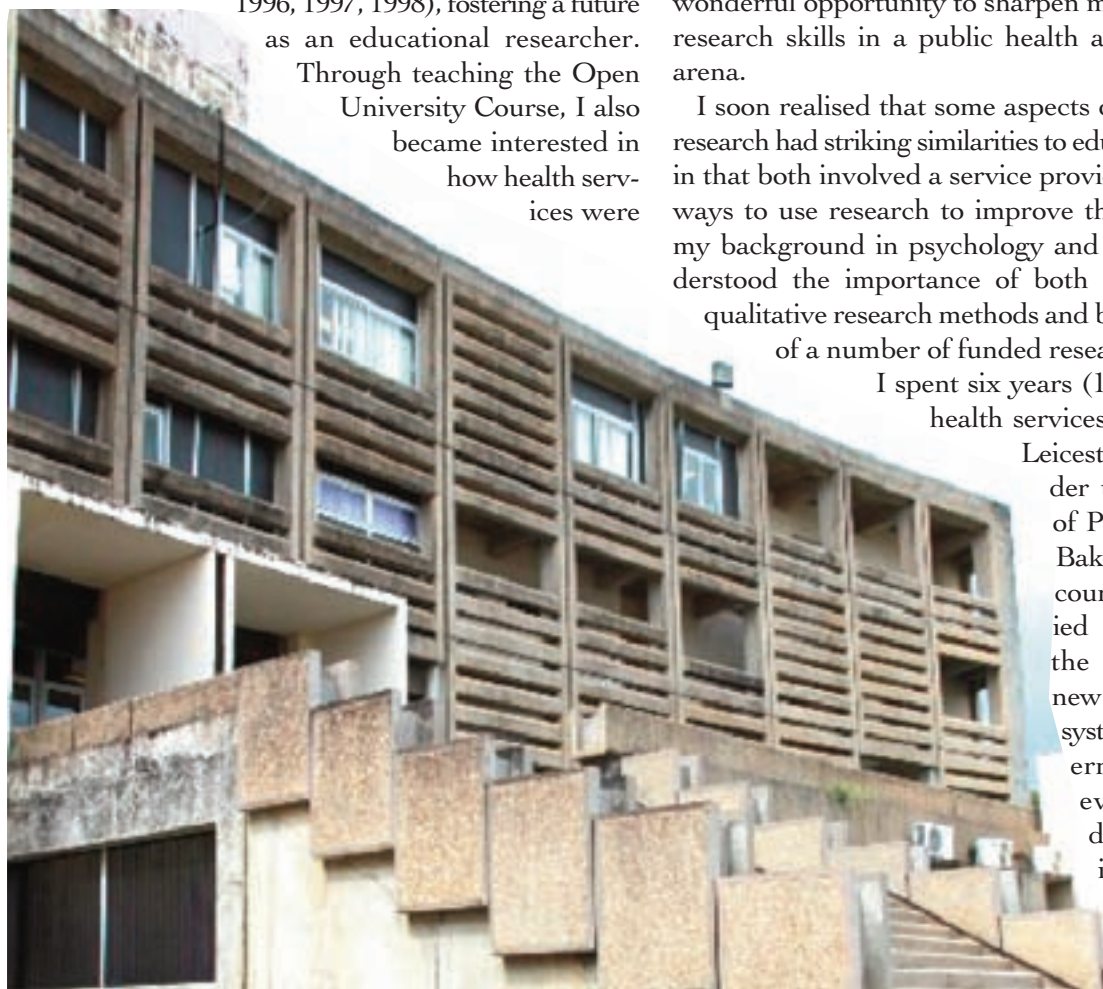
researched and looked for an opportunity to move into that field.

In 1996, I was accepted as a Senior Researcher in a health services research unit within Leicester University's faculty of medicine, which provided me with a wonderful opportunity to sharpen my health services research skills in a public health and primary care arena.

I soon realised that some aspects of health services research had striking similarities to educational research in that both involved a service provider and explored ways to use research to improve the service. Given my background in psychology and education, I understood the importance of both quantitative and qualitative research methods and became a member of a number of funded research projects.

I spent six years (1996-2002) in the health services research unit at

Leicester University under the watchful eye of Professor Richard Baker. With his encouragement, I studied for my PhD on the acceptance of a new NHS health care system (Clinical Governance) that was eventually introduced in the UK in 1998. I closely monitored this new health care system and the



The St Augustine Campus uses a Problem Based Learning approach to supporting the medical curriculum and this provides opportunities for researching student and staff performance in this field.

attitudes of primary care staff to the new ways of working. As a result, the Practice Culture Questionnaire (PCQ) was developed as a valid and reliable measuring instrument of resistance towards quality improvement activities that has been independently evaluated and is now used as a research tool in Europe and the States and most recently, in Canada.

In 2002 I took up the role of Associate Professor with responsibility for developing Postgraduate Health Services Research degrees with special responsibility for the School of Nursing, Faculty of Medical Sciences, Nottingham University. I held a Research and Teaching contract and was nominated for a Lord Dearing teaching award for excellence in teaching of research design and practice by international students on this programme.

Apart from contributing to both undergraduate and postgraduate teaching, I was an active publisher in a number of health services journals. I was already Principal Investigator for a research project on a method for accessing patients views on improving health services, implementing agreed views into providing the service and developing further research activity including looking at telemedicine, developing a training course for simulated patients, and investigating bullying of nursing students in NHS Hospital placements.

I continued to published in the area of University Student expectations of teaching (2002, 2004, 2006) and also co-led a national study investigating the experience and expectations of international students and the barriers they

faced in studying for a PhD in UK universities (2007-2009)

After seven years at Nottingham University, I felt it was time to move again and in August 2007, I applied for the post of Professor of Medical Education at UWI Trinidad Campus and was accepted. On arrival I was asked to take on the role of Associate Dean Medical Sciences Curriculum. My portfolio involved supporting faculty staff in their understanding of teaching and assessment within their specialist areas and also leading medical education specialist staff in developing their medical research careers.

The St Augustine Campus uses a Problem Based Learning approach to supporting the medical curriculum and this provides opportunities for researching student and staff performance in this field. Currently, we have looked at UWI medical students' expectations of teaching as well as launching a study tracking students' levels of empathy across their five years of medical training.

In summary I feel that 25 years researching how university students like to learn have taught me that teachers need to be ever vigilant. Good teachers always question whether they could teach better. Being an educational researcher has allowed me to pose questions about what makes an effective teacher.

I am moving from my post at UWI to take on the Foundation Chair of Interprofessional Education at Glasgow Caledonian University in Scotland UK. I will of course retain contact with the many excellent teachers I have met in my time here.



KEITH STEVENSON

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PUBLICATIONS

Stevenson K. Developing Clinical Audit in Primary Health Care. (1998) Leicester University Press.

Baker R, Stevenson K, Redsell S, Shaw E. (2002) Principles for Best Practice In Clinical Audit Radcliffe Medical Press. Abingdon Oxford.

Baker R, Stevenson K, Redsell S, Shaw E. (2002) Clinical Audit : A Review of the Evidence Radcliffe medical Press Abingdon Oxford.

Surujpal Teelucksingh

Professor - Medicine

Department of Clinical Medical Sciences



Professor Teelucksingh's contributions to the field of medical science in the region includes research into non-communicable disease (NCD) (like diabetes and obesity) and the introduction of sociological, rather than pedagogic or prescriptive methods to cause communities to adopt lifestyles that would make them healthier.

He specialises in internal medicine, diabetes and endocrinology and is exploring the connection between diabetes and heart disease—an area that although well-known remains poorly understood in medical science. He chairs a Cabinet-appointed Technical Advisory Committee that reports to the Minister of Health of Trinidad and Tobago on strategies to combat chronic diseases.

In addition to his clinical and scientific work, he is concerned with training better doctors, introducing OSCE (Objective Structured Clinical Examination) as the concluding examination method at the UWI's Faculty of Medical Sciences. The OSCE tests clinical competence in skills such as communication, clinical examination, medical procedures, prescriptions, and data interpretation.

He has also led the university in implementing medical

examination formats in keeping with internationally accepted standards, and developed a curriculum for Public Education in Diabetes.

Prof Teelucksingh's work has been widely recognised. He has published in various medical journals including the prestigious *The Lancet*, *New England Journal of Medicine*, *Clinical Science*, *Caribbean Medical Journal*, *West Indian Medical Journal*, and *Caribbean Health* among others. He is a Fellow of the Royal College of Physicians of Edinburgh in the UK, and at present, serves on the Medical Board of Trinidad & Tobago and is the University's Public Orator.

Research Summary

Diabetes and coronary artery disease together account for half of all deaths in Trinidad and Tobago. In addition to the years of life lost, there is considerable loss of earnings and productivity.

Our research team, recognising the need for and value of preventative strategies, has developed a five-pronged approach to investigating, understanding and reducing the burden of heart disease, diabetes and their complications in our population.



1. Diabetes screening:

(PhD Student, Yvonne Batson). Project Lead: S Teelucksingh

We have developed a methodology for screening school children for diabetes established through private funding through The Helen Bhagwansingh's Diabetes Education, Research and Prevention Institute—a non-profit organisation linking The University to the private sector.

In a research and demonstration project, screening of 70,000 students has unearthed two dozen children with diabetes who could have gone unnoticed with the risk of complications ensuing had they not been detected and treated.

We propose to share this data with a wide cross section of stakeholders including the Ministries of Health and Education to make this a national annual effort.

2. Diabetic foot disease:

Collaborators-Professors Vijay Narayansingh, T Seemungal and S Teelucksingh

We have elucidated and characterised a new clinical diagnostic test of high sensitivity and specificity for diabetic feet that are at high risk of infection and amputation. We are currently establishing a multicentre cross sectional study to utilise this test for broad base community and population screening. This project is in a developmental stage.

3. Supra Regional Data Centre:

InterAmerican Development Bank Re-

gional Public Good Grant. Project Lead: S Teelucksingh.

The Ministries of Health of six Caricom countries and CAREC/PAHO are collaborating with the University of the West Indies to develop a data gathering and collation mechanism that would allow access to high quality data on chronic non-communicable diseases.

The participating countries are Belize, Barbados, Bahamas, Jamaica, Guyana and Trinidad and Tobago. Expected Project completion date is mid 2011. A website for this project is currently under development.

4. Basic Science Research:

Collaborators – Professor Terence Seemungal and Professor Lexley Pinto-Pereira.

We are currently conducting pioneering research aimed at understanding and elucidating pathogenetic mechanisms and therapeutic interventions for coronary artery disease, chronic lung disease and diabetes. See Pinto Pereira LM, Seemungal T, Teelucksingh S, Nayak BS. Markers of lung function and inflammation in West Indian diabetics Accepted: European Respiratory Society, September 2010.

5. Disease management of Diabetes

Based on the CHRC guidelines we have explored diabetes management in public sector facilities and viewed the same vis-a-vis patient management in the United Kingdom. This information will be made available to the Ministry of Health to enable good disease management.



SURUJPAL TEELUCKSINGH

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PUBLICATIONS

Y. Batson, S. Teelucksingh, R. G. Maharaj, BN Cockburn-Identification of Diabetes in children from a mass urine screening- *West Indian Med J* 2010; 59 (Suppl.) 2:54

Teelucksingh S, Ramdass M J, Charran A, Mungalsingh C, Seemungal T, Naraynsingh V. – The slipping slipper sign: marker of severe peripheral diabetic neuropathy and foot sepsis - *Postgraduate Medical Journal* 2009; 85: 288-291

Teelucksingh S and Pinto Pereira L. Metformin: an important tool for endocrinology in the West Indies. New tricks for an old drug. *British Journal of Diabetes and Vascular Disease*. 2009; 9:232-236.

Faculty of Humanities and Education



The Faculty of Humanities & Education (FHE) continues to maintain its commitment of relevance to the wider society, through the strengthening of relationships with our main stakeholders and an emphasis on research. Over the last decade the various Departments of the Faculty have expanded, adding new areas such as the Film Studies and engaging in quality Research, which has garnered recognition not only in the region but internationally.

The following represents selected areas of research that involve both staff and graduate students in the six divisions of this faculty—Departments of History and Liberal Arts, the School of Education, the Department of Creative and Festival Arts, the Centre for Language Learning and the Film Programme—for the academic years 1999/2000 to 2009/2010. The topics and researchers presented here are by no means exhaustive of the wealth of ongoing research from these departments.

School of Education:

This is the largest department in the faculty and its research has immediate and far reaching impacts on the understanding and delivery of education. Collaborative research such as a Multi-Site Teacher Education Research Project (MUSTER) between UWI and the University of Sussex also establishes the global reach of our research agenda.

Research areas in the school include Classroom Communication, Science Education, Schooling and Citizenship, Technology and Learning, School leadership, Bibliographic Research, Childrearing beliefs and practices, Parental behaviours, and Gender Differentials in Educational Achievements and performance. Selected topics of research and researchers during this period are:

- **Joycelyn Rampersad** - Inside a Health and Family Life Education (HFLE) Project: The challenges of developing a framework for adoption of HFLE in the formal educational sector of Trinidad and Tobago.
- **June George and Susan Herbert** - Correlates of Learning Outcomes in Trinidad and Tobago, designed to investigate the relationships between student achievement and the traits of schools, the classroom, the home, teachers and the student in collaboration with the University of Victoria, British Columbia.
- **Susan Herbert and Marcia Rainford** - Continuing Professional Development of Secondary Science Teachers
- **Lynda Quamina-Aiyejina** - Bibliographic Research on Education and Training preparatory to the compilation of a bibliography for staff and students of the School of Education.
- **Jeniffer Mohammed** - Five-country (Malaysia,





Dr. Elizabeth Walcott-Hackshaw Deputy Dean, Graduate Studies and Research

India, Seychelles, Mozambique and Trinidad and Tobago) research study on gender interventions under the aegis of the Commonwealth Secretariat.

- David Plummer - The Everyday Impact of HIV on Jamaican Schools
- Dorian Barrow and Samuel Lochan - The Extra-lessons phenomenon research extended to include Barbados, Grenada, St. Vincent and Dominica
- Carol Logie - Family Development and Children's Research Centre (FDCRC) focusing on Child Development, Comparative studies in early childhood and Cost benefit analysis and its link to quality early childhood education

Department of History

A longstanding and prolific department in the Faculty has a range of research themes including a history of decolonisation of the Caribbean, Reinterpreting the Slave Experience, Social Formation and Race Relations in the British West Indies and a history of East Indians in the Caribbean and Contesting Past Narratives of Trinidad and Tobago's History. Some selected research by staff are:

- Bridget Brereton - Gender and Caribbean in Historiography

- Rita Pemberton – A History of Forest Conservation in the British Caribbean
- Jerome Teelucksingh – Labour Relations and Trade Unions in Trinidad.
- Basil Reid – Archaeology and Geo-informatics: Case Studies from the Caribbean.
- Heather Cateau – Revisionism in Caribbean Historiography
- Claudius Fergus – Anansi, an African Legacy: Bridging Time, Spaces and Spirits
- Michael Toussaint – Women in the Politics of Trinidad and Tobago in the 20th century
- Sherry-Ann Singh – School Curriculum and the Indian Diaspora: The Case of Trinidad.

Department of Liberal Arts

The Department of Liberal Arts researches themes ranging from the endangered languages of the region (with a focus on their description and preservation), to the literatures and cultures of the region, and into applied discourse areas such as the representation of violence and gender in literature, media and the law. Some thematic areas of research are Black American Literature, Caribbean Linguistics, Communications including aspects of medical communication and Speech Language Pathology. Selected faculty research that exemplify some of these themes are:

- Barbara Lalla – Research on Post-colonial Caribbean and medieval discourse.
- Nicole Roberts and Elizabeth Walcott-Hackshaw – Anthology of short stories by contemporary women writers from the Anglophone, Francophone and Hispanophone regions
- Jean Antoine-Dunne – The essays, poetry and plays of Walcott; and archival research on the interface between film and poetry in his work.
- Benjamin Braithwaite and Kathy-Ann Drayton – Trinidadian Sign Language (TSL).
- Christiana Abraham – Building Responsive Policy: Gender, Sexual Culture and HIV & AIDS in the Caribbean: Baseline Assessment and Case Studies', in collaboration with the Institute of Gender and Development Studies (UWI)
- Jo-Anne Ferreira – Research into teaching phonetics

and phonology of Caribbean English, French and Spanish to Caribbean students.

Department of Creative and Festival Arts

Department of Creative and Festival Arts research areas of dynamic creativity in this society and in the region, creating action research through its interface with the creative sectors and industries.

Among the topics undertaken are Dynamic Drama for the Primary Schools and Preaching, Praying and Singing of the Shouters in the course of Ritual Performance. Selected staff research themes include:

- Jo-Anne Tull and Tamara Da Breo – The challenges and prospects of the comic industry in Trinidad as an emerging cultural industry.
- Kenwyn Murray – Masquerade and Design



- Jeannie Remy – The complete history of the Invaders Steel Orchestra
- Satanand Sharma – The original compositions of Jit Samaroo

Centre for Language Learning

The Centre for Language Learning, fully occupied with major language teaching programmes, also engages in serious research around the teaching of Spanish at all Primary School level and the teaching and learning of foreign languages in Secondary School in Trinidad and Tobago. Among its research topics are:

- Beverly-Anne Carter and Amina Ibrahim-Ali and Dianne Williams (Faculty of Social Sciences)– Medical Communications on Cuban

Doctors in Trinidad

- Maria Landa Buil, Neva, Amina Ibrahim-Ali and Beverly-Anne Carter – Tandem learning project between CLL Spanish students and EFL students at Universidad EAN, Colombia.

The recent addition of a Film Programme to this Faculty in the last few years of the decade taps into the expansion and importance of film in teaching, communication and entertainment industry and in the definition of Caribbean identity through image making. Among the areas of focus for research are Caribbean film and filmmakers by Bruce Paddington and Jean Antoine-Dunne, Robert Ramesar, Christopher Meir—The environment as a subject of film.



Funso Aiyejina

Professor - Literature in English, African and Asian Studies
Dean, Faculty of Humanities & Education



Funso Aiyejina taught at Obafemi Awolowo University, Ile-Ife, Nigeria before relocating to the University of the West Indies, St. Augustine, where he is currently Professor of Literatures in English and Dean of the Faculty of Humanities and Education. He is the author/editor of seven books, two monographs, and two playscripts. He has published extensively in refereed and non-refereed journals, submitted chapters for books, has interviewed other authors and has himself been interviewed on his literary work.

Aiyejina has also presented 15 conference papers, produced two translations, and one documentary video. With respect to his literary output and published books, he has published individual short stories in 12 major national and international anthologies and individual poems in 11 anthologies and 29 journal issues.

Aiyejina is both a literary/culture critic and researcher and an award-winning creative writer. His research interests include African culture/literature, Caribbean literature and Afro-Caribbean culture, especially Orisa tradition. His short stories and poems have been published in local and international journals and in international anthologies such as *The Anchor Book of African Stories*, *Literature Without Borders*, *Kiss and Quarrel: Yoruba/English – Strategies for Mediation*, *New Poetry from Africa*, and *The New African Poetry*. He has been described by Gerald Moore and Ulli Beier, editors of *The Penguin Book of Modern African Poetry*, as “one of Nigeria’s finest satirists. Some of his works have been translated into Russian, German, Urdu, Hindi, and Chinese.

His first poetry book, *A Letter to Lynda and Other Poems* (1988 and 2006) won the Association of Nigerian Authors’ Poetry Prize in 1989. *I, The Supreme and Other Poems* (2004) was shortlisted for the same prize, and *The Legend of the Rockbills and Other Stories* (1999) (his first fiction) won Best First Book (Africa), Commonwealth Writers Prize, 2000. The latter has been described as “a wonderful book of short stories” (Outlook India.com, April 2000) and is distinguished by its “biting satire and gentle humour, and an almost Orientalist karmic attitude towards life’s vicissitudes” (The Book Review, Vol. XXIV Number 4, April 2000:20). Aiyejina is also the author of *The Character Who Walked Out On His Author*, which has been staged in Trinidad and Tobago, Jamaica and Nigeria.

Aiyejina is a graduate of the University of Ife (now Obafemi Awolowo University), Ile-Ife, Nigeria; Acadia University, Wolfville, NS, Canada; and the University of the West Indies, St. Augustine, Trinidad and Tobago. At UWI, he pursued a PhD on “Africa in West Indian Literature: From Claude McKay to Edward Kamau Brathwaite”. The subject of African cultural retention in, and influence on, the New World continues to be a central pre-occupation in his academic and literary production.

Aiyejina deploys the personal ties he has developed in the Caribbean as metaphors for the relationship between the continent and the Caribbean archipelago and the role that awareness of the ancestral links has to play in the development of both regions. His work



He is a leading scholar of the works of Earl Lovelace and has advanced the central argument that Lovelace's art can best be appreciated through the lenses of 'bacchanal aesthetics'.

demonstrates that it is not sufficient to create an authentic narrative of Africa without referencing her Diaspora, just as it is not possible to properly narrate the Diaspora without a backward glance to ancestry. His creative works are extensions of his academic straddling of Africa and the Caribbean.

He has published widely on African and West Indian literature and culture including essays and reviews on Brathwaite, VS Reid, Dennis Williams, George Lamming, Wole Soyinka, Christopher Okigbo, Mabel Segun, Odia Ofeimun and Niyi Osundare among others. He has also theorised on Nigerian poetry with his 1988 analysis "Recent Nigerian Poetry in English: An Alter/Native Tradition," a landmark essay in the discussion of Nigerian poetry in English.



He is a leading scholar of the works of Earl Lovelace and has advanced the central argument that Lovelace's art can best be appreciated through the lenses of "bacchanal aesthetics"—an aesthetic rooted in the indigenous tradition of the New World African, which acknowledges the multiplicity of options that define the essence of the Esu-Elegbara, the Yoruba deity of choice and personal will, as well as the multicultural imperatives that underpin the evolution of the New World.

In theorising on Africa and Caribbean literature, Aiyejina has privileged the nexus between ritual and literary tropes. In essays such as "Narrating the Narrator: An Occasion for Celebration" (2008), "Novelypso: Earl Lovelace and the Bacchanal Tradition" (2008), and "Unmasking the Chantwell Narrator in

Earl Lovelace's Fiction" (2007), Aiyejina analyses and explores the various African-influenced traditions that have imbued Lovelace's work and inspired its complex and multifaceted nature. It is virtually impossible to research Lovelace without referencing Aiyejina.

Aiyejina's recognition of tradition as the ultimate source of the inspiration for African and African-Caribbean aesthetic culminated in his 2007 Professorial Inaugural lecture, "Decolonising Myth: From Esu to Bacchanal Aesthetics". He challenged the accepted Western/Christian interpretation of the Yoruba deity Esu, questioning the interpretation, deconstructing its meaning within the Yoruba, and by extension African worldview, then reconstructing the notion of Esu into an aesthetic framework for discussing both African and Caribbean culture.

In July 2009, he delivered a version of the lecture before an African audience at National Theatre, Lagos, Nigeria and at the Awolowo Obafemi University in Ife.

He has written about Orisa tradition in Trinidad and Tobago and has collaborated with Maureen Warner-Lewis to transcribe and translate Yoruba songs from Grenada (*Grenada: Creole and Yoruba Voices: the 1962 Field Recordings of Alan Lomax*. Rounder 11661-1728-2, 2001). With Rawle Gibbons and Baba Sam Phills, he has published on Orisa tradition in Trinidad and collected and published Orisa songs from Trinidad (*Songs of the Orisha Palais of Trinidad and Tobago*, cd, 2005).

He is a co-facilitator of the Cropper Foundation/UWI Residential Writers Workshop, an editorial board member of several local and international journals, founding coordinator of UWI, St. Augustine's Campus Literature Week, coordinator of the MFA Fiction Programme in the Department of Liberal Arts, and an Honorary Fellow of the International Writers Workshop, Hong Kong Baptist University, Hong Kong.



FUNSO AIYEJINA

Professor

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PUBLICATIONS

Editor of *A Place in the World: Essays and Tributes in Honour of Earl Lovelace at 70* (2009), co-editor of *Caribbean Literature in a Global Context* (2006), and editor of *Earl Lovelace: Growing in the Dark* (Selected Essays) (2003), *Self-Portrait: Interviews with Ten West Indian Writers and Two Critics* (2003).

The Legend of the Rockhills and Other Stories, Tsar Productions, 2000

Funso Aiyejina, *I, The Supreme and Other Poems*. Ibadan, Nigeria: Kraft Books, 2004. 73pp.

Bridget Brereton

Professor - History
Professor Emerita



I have continuously pursued my research interest in the social history of the nineteenth and twentieth century Caribbean.

Bridget Brereton

I was promoted Professor of History in 1995/96 mainly on the basis of my books on the history of Trinidad, which even by that time had become classics: *Race Relations in Colonial Trinidad* (Cambridge University Press, 1979) and *A History of Modern Trinidad, 1783-1962* (Heinemann 1981). I had also published a short text on the history of Trinidad and Tobago for school children (*An Introduction to the History of Trinidad and Tobago*, Heinemann 1994) and an earlier CXC text, *Social Life in the Caribbean, 1838-1938* (Heinemann 1985), both of which are still used in the national and regional schools.

Since promotion I have continued to research and publish on the history of Trinidad and Tobago, publishing many essays, papers and book chapters on this subject.

I have also served as co-editor of several important nineteenth and twentieth century writings from Trinidad, including three early novels (a three-volume series, 'Caribbean Heritage', published by the UWI Press between 2001 and 2006), memoirs by Edric Connor (2006) and Percy Fraser (2007), and a *Dictionary of Trinidad and Tobago Biography* (1998).

Most recently, I am the author of a history of the St Augustine Campus, published in 2010 for the 50th Anniversary of that Campus entitled *From Imperial College to University of the West Indies: A History of the St Augustine Campus, Trinidad & Tobago* (Ian Randle 2010)

I have continuously pursued my research interest in the social history of the nineteenth and twentieth century Caribbean. In addition to many essays, papers and book chapters, I am co-editor of *The Colonial Caribbean in Transition: Essays on Post-Emancipation Social and Cultural History* (UWI Press and University Press of Florida, 1999), and the editor of Volume V of the UNESCO General History of the Caribbean, *The Caribbean in the Twentieth Century* (2004).



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PUBLICATIONS

Race Relations in Colonial Trinidad, 1870-1900 (Cambridge University Press, 1979)

A History of Modern Trinidad, 1783-1962 (Heinemann 1981, 1989)

Law, Justice and Empire: The Colonial Career of John Gorrie, 1829-1892 (UWI Press 1997)

The Colonial Caribbean in Transition (Co- Editor) (UWI Press 1999)

The Caribbean in the Twentieth Century (Editor) (Macmillan/UNESCO 2004)

Barbara Lalla

Professor - Language and Literature



Earlier Research

Barbara Lalla has developed three main areas of original research:

- historical reconstruction of Jamaican Creole through textual analysis
- literary discourse analysis of Caribbean Literature
- Caribbean re-reading of other canons.

Initially, she conducted original research on the development of Jamaican language. In a collaborative project with Jean D'Costa, data from untapped oral and archival sources, analysis of linguistic change and reconstruction, led to the publication of *Voices in Exile* (1989) and *Language in Exile* (1990). These publications traced the linguistic evolution of Creole, supported by maps, charts and tables. Hence, the provenance and

nature of early Creole at lexical, phonological, morphological and syntactic levels were outlined.

Subsequently, Barbara Lalla traced the discursive developments in Jamaican literature, drawing again on archival sources and tracing these to more current narrative. This led to the single-authored study *Defining Jamaican Fiction: Marronage and the Discourse of Survival* (1996).

Professional developments on this interest in Caribbean language included the practical application of knowledge regarding the Creole/English interface to the needs of tertiary learners.

Leading UWI's thrust in distance learning, Lalla continued to publish articles and present papers on language history in the Anglophone Caribbean, scribal representation of Caribbean Creole, and the development of



Caribbean literary discourse. These research interests attracted doctoral students (such as Rawwida Baksh-Soodeen and Jo-Anne Ferreira) who completed dissertations in Caribbean language history.

Additionally, Barbara Lalla was engaged in substantial research to support her creative writing. Drawing on archival material and oral interviews, she produced a historical novel, *Arch of Fire* (1998), which was subsequently translated into German.

This body of work won her the Vice Chancellor's Award for Excellence (1999) and her appointment as Professor of Language and Literature that year.

Recent and Current Research

Subsequently, Lalla extended her research in textual analysis to focus on the representation of the Caribbean voice in literary discourse and to the language culture underpinning Caribbean literature. She has pursued narrative and linguistic analysis of Caribbean literary works of Rhys, Lovelace, Senior, Goodison, Naipaul and Hopkinson; and other in a number of articles; and in invited plenary addresses such as the 2003 Conference of the Society of Pidgin and Creole Languages at the University of Hawaii, the 2004 Cultural Studies Conference, at UWI St. Augustine and the 2010 Conference on West Indian Literature at UWI Mona.

She has continued in practical application of her understanding of literary discourse for the support of self access learning, while pursuing scholarly work on Caribbean literary and language discourse collaboratively with Jean D'Costa and Velma Pollard. This area has attracted several research students who have completed or are pursuing theses and dissertations in literary linguistics and linguistic criticism (among them doctoral dissertations by Merle Hodge and Geraldine Skeete).

The above interests were related to a large interdisciplinary project "An investigation of Caribbean Cultural Dynamics and the Globalization of Culture" designed by Barbara Lalla in collaboration with

some scholars and funded by the Government of Trinidad and Tobago. This project has supported publications, teaching material, the production of an online journal by Paula Morgan and others and the submission of material by Basil Reid for an exhibition in a Cultural Studies Virtual Museum created by Patricia Mohammed.

Lalla has also worked with Jennifer Rahim on the publication of *Beyond Boundaries: Papers on Caribbean Culture* (2009) and *Created in the West Indies. Caribbean Perspectives on V. S. Naipaul*, (forthcoming). Simultaneously, an interest in graduate research within the region and to increasing access to Caribbean material for more advanced scholars has prompted a collaborative project on research methodology itself. In a project on Research Methods in Caribbean Literary and Discourse Culture, Lalla is working with a UWI team to produce a scholarly guide and self-access course for graduate researchers.

Lalla's contribution to the cultural products of the Caribbean continues through her creative writing. Another novel, *Cascade*, has been selected by UWI Press as its first fictional work for publication and is in press. Additionally, having proposed a project on "Caribbean Postscripts: Afterwords on the British Canon" (which attracted a UWI Press award for Outstanding Publishing Proposal, 2005), she produced as the first volume in this series a major original study, *Postcolonialisms: Caribbean Re-reading of Medieval English Discourse*. (2008). This area of specifically Caribbean perspectives on other canons has also attracted graduate research with such diverse interests as Chaucer, Tolkien and Hemmingway, as Romance and Science Fiction genres. Meanwhile, the concept of the Postscripts series has been refined collaboratively by a group within the department, and particularly by Dr Giselle Rampaul. A second volume is in the making.

Barbara Lalla recently assisted her department in defining its research profile and agenda.



BARBARA ANN LALLA

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PUBLICATIONS

2008. *Postcolonialisms: Caribbean Re-reading of Medieval English Discourse*. Kingston: University of the West Indies Press.

1998. *Arch of Fire*. (Historical novel.) Kingston: Kingston Publishers. (520 pages.) Translated into German 2000. Flammendes Land. Verlagshaus.

1990. *Language in Exile: Three Hundred Years of Jamaican Creole*. Tuscaloosa and London: The University of Alabama Press. (Co-authored, Barbara Lalla and Jean D'Costa). (253 pages.) Reprinted in paperback 2009. Electronic forthcoming.

Ian Robertson

Professor - Linguistics
Department of Liberal Arts



The students prepared a linguistic map of every home on every street in the village of Bartica.

Ian E. Robertson was awarded a B.A. in English (Special Hons.) from the University of the West Indies, Mona Campus in 1969 and his PhD.(Linguistics) in 1980 from the University of the West Indies, St. Augustine Campus. He was the first student to be awarded this degree from the St Augustine Campus.

Promotion to the rank of Professor was sought on the range of criteria normally applied to such appointments. These included a teaching and administrative profile and a wide-ranging set of research outputs. His research covered three main areas, Creole Languages Studies, Endangered Languages and Dialects in the Caribbean and Language Education.

Throughout his tenure at the St. Augustine Campus, he has served at senior academic and administrative levels. Up to his retirement in 2009, he served in the capacity as Dean of the Faculty of Humanities & Arts.

His research interests include: Language History, Language Maintenance and Language Death, Creole

Language Development and Maintenance, English Language Teaching in Creole Communities and Use of Indigenous Resources for Education. His contribution to field of linguistics is expansive, substantive and incomparable.

Additionally, he is a member of the following professional associations: Society for Caribbean Linguistics, Linguistic Society of America, Society for Pidgin and Creole Linguistics and Association of Curriculum Supervisors and Developers.

The Creole studies were initiated by archival work in support of a thesis that the Dutch language must have had a Creole counterpart similar to those of the French and the English. Once the historical existence was confirmed for Guyana, field research was undertaken to determine the contemporary status of the language(s). It turned out that there had been two such languages in Guyana, one already dead and the other almost so. The discovery allowed for audio and video recordings to be made of the last 30 or so

speakers. This language is now all but dead since only one speaker is known to be alive.

The study of the Dutch lexicon Creoles has raised significant issues in areas such as Creole Genesis and in the case of Berbice Dutch has supplied considerable insight into the very early history of the Berbice colony for which no documents are known to exist. Research on endangered languages involved the documentation of the sociolinguistic status of Lokoo (Arawak) Kalina (Carib) and Bhoj Puri in Guyana. The first two are indigenous languages and the last one is a heritage language that is quickly disappearing.

Education research and publication has tended to focus mainly on the area of language education with specific emphasis on the teaching and learning of the official language English in Creole sociolinguistic complexes in the Caribbean. There were also some presentations on the roles of indigenous resources for education in Caribbean states. In the last year, Robertson has added to this discourse and a full-length documentary of the link between the Eastern Ijo of the Niger Delta area in Nigeria and the colony of Berbice, which sheds considerable

light on the sociohistorical patterns of interaction in that colony under the Dutch.

Over the years, his research has made important contribution to the field of linguistics. Some of the following projects illustrate his accomplishments in this field:

- Research of historical documents to establish the previously unknown phenomenon of the Creolisation of the Dutch language in a Dutch colony
- Discovery of the last thirty speakers of One Dutch-lexicon Creole language in the former Dutch colony of Berbice in Guyana
- Discovery of a few people who had minimal passive control of a second Dutch lexicon Creole language found in the former Dutch colony of Essequibo in Guyana
- Documentation of French lexicon Creole language spoken by a significant St Lucian migrant community in the interior of Guyana.
- Documentation of linguistic heritage of specific locations in Guyana.
- Approaches to the Teaching of the Official language in the officially English speaking Caribbean.



Having a working lunch at 3 p.m., 90 miles up the Canje Creek.



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PUBLICATIONS

Simmons-Mc Donald, Hazel and Ian Robertson (eds) *Exploring the Boundaries of Caribbean Creole Languages*, 2006 Jamaica, U. W. I Press

Robertson, Ian E, "Guyana's Dutch lexicon Creoles: the Demerara (dis)connection", *The Arts Journal*, Vol 5 Numbers 1 & 2 The Arts Forum Inc. 2009

VIDEO DOCUMENTARIES.
Caribbean Language Series I Language: Using the Caribbean Oral Traditions to explore the relationship between the Creole language and the Official language in the Caribbean

Three Guyanese languages: Going, Going, Gone! A documentation of the moribund status of three Guyanese languages

Valerie Youssef

Professor - Linguistics
Department of Liberal Arts



My research in linguistics has carried me through the sub-areas of language acquisition and learning, descriptive linguistics and discourse analysis, amongst others. Each one has been both exciting and rewarding.

When I began my Ph. D, I believed that I might be able to contribute to the debate over what may be universal in the human language faculty. Language has been found to be peculiar to man and to have common features wherever it occurs; on this basis Derek Bickerton (1980) posited a “language bioprogram” hypothesis, suggesting that specific semantic categories would emerge in all children and at early stage. I investigated the early spontaneous speech of two-year-old Trinidadian children exposed differentially to both Trinidad Creole and Standard English and made some headway, which culminated in my first substantial publication in the *Journal of Child Language: The early development of perfect aspect* (1990), following two responsive critiques in the same Journal in 1989 and 1990.

I continued to expand my concerns in child language acquisition. The study of small children, recorded fortnightly between ages two and four showed that language acquisition could not be divorced from the stylistic or situational uses. My investigations found that in an

American context, children waited until they were adolescent before they developed stylistic awareness and capacity. This culminated in further international publications, perhaps the most important being *Variation in the acquisition of language in the Trinidad context*, which appeared in *Language Variation and Change* (1991). These discoveries led me firmly into sociolinguistics, coining the term varilingualism to describe the competence that local children display as they balance language varieties in their language output from the earliest stage. This term has achieved some international recognition. It was refined further to apply to adult language for a paper in the *Journal of Pidgin and Creole Languages* in 1996. Recently, I was invited to explicate it again in a paper entitled: *Varilingualism: A Term for Twenty-First Century Language Acquisition Contexts* for the French journal *Education et Sociétés Plurilingues* (2010).

One of the challenges in Caribbean linguistics is that the discipline is relatively young—at least in reference to Caribbean linguists looking at their own languages. Many scholars have spent their working lives exactly as they should, describing the Creoles and other indigenous languages to the region. I have been able to contribute to that work through *The Languages of Tobago* co-

published with Dr. Winford James in 2002. based on data collected as part of the Tobago Language Project throughout the 1990s. This descriptive work has been augmented in the period since 2004 at which time I began to work with Dr. Dagmar Deuber, then of Freiburg University in the field of corpus linguistics, a computer-based approach to language description. We are currently extending the study to Tobago and have been able to establish a Trinidad and Tobago arm of the International Corpus of English, utilised by linguists world-wide.

In the course of doing this work I was asked to contribute again with Dr. Winford James, to a four-volume work the *Mouton Handbook of Varieties of English* published by Mouton de Gruyter (2004) in the specific volume The Americas and the Caribbean.

Throughout the last 20 years I have gradually extended my research in an entirely different field, however, that of discourse analysis (DA). In 1990, I encountered a Professor of Sociology from the UK, David Silverman of Goldsmith's College, University of London, who needed help to transcribe recordings of interviews between Queen's Park Counselling Centre HIV/AIDS counsellors and their clients, the taboos against HIV positive people seemed insurmountable. Silverman had been privileged to sit in on pre- and post-test counselling sessions. The interviews provided raw material for workshops that Silverman would run for practitioners and also integrate into his research pool of similar data collected in the UK, Australia and the USA.

My own immediate concern was to establish whether the same norms applied in our own setting. Cultural norms for discussing delicate issues would be expected to vary quite widely. Two communicative formats dominated counselling sessions in the UK. The first was an Information-delivery format (IDF) and the second an Interview-type format (IVF). Generally, it was felt that maximal communication was achieved through a series

of questions that demand client response. For topics such as sexual practices and safer sex, counsellors often move rapidly into an Information-Delivery format perhaps because of the stress of discussing sexually taboo topics but the reality is that such information is not well retained.

In Trinidad it was noted that, as in the UK, counsellors preferred IVFs and IDFs. However, there were marked differences from the UK findings in that a number of patients resisted an IVF at the outset of counselling, forcing the counsellor back on information-giving on several occasions and sometimes provoking a challenge in the patient. This work: Normative Expectations for Medical Talk was published in *Language and Communication* (1992).

As my own work progressed, I found that it was useful to examine a diversity of conversational elements if we were to creatively pursue what really worked in diverse circumstances and with diverse clients. I worked not just with interviews but subsequently supported work being done on the improvement of communication on the National AIDS Hotline service. This led to publications that included: "When 'same sex' talk works: Issues of communicative success on a telephone response service" in *Illness, Crisis and Loss* (2001).

Bridging the medical discourse, I have also worked in classroom discourse and both political and media discourse, and more recently on the depiction of crimes of violence in a range of discourse types in this society. This work is represented in *Writing Rage: Unmasking Violence in Caribbean Discourse* (2006), a collaborative publication with Dr. Paula Morgan. Dr Morgan interrogated the depiction of violence in literary texts whilst I examined newspaper depictions, personal narratives, and judicial statements.

Other areas of my work have included the field of language education in the Caribbean region as well as classroom discourse. I do hope that this brief overview may serve to introduce effectively my research range.



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PUBLICATIONS

Valerie Youssef "Varilingualism: the competence behind code-mixing in Trinidad Tobago" *Journal of Pidgin & Creole Languages*, 1996, 11:1, 1-22.

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Dr. Linda Hadeed **Deputy Dean, Graduate Studies and Research**

During the past ten years, the Faculty of Social Sciences, UWI St. Augustine Campus has continuously demonstrated its commitment to the pursuit of scholarship through the research and publications carried out by its academic staff members and graduate students. The Faculty comprises three main departments and several associated institutes, centres and units. The Departments are Behavioural Sciences, Economics and Management Studies. The affiliated Centres and Institutes are the Caribbean Centre for Money and Finance (CCMF); Centre for Health Economics (HEU), which falls under the Department of Economics; Institute of International Relations (IIR); and

Sir Arthur Lewis Institute for Social and Economic Studies and The Institute for Gender and Development Studies (IGDS). Each of the Institutes and Centres have concentrated areas of research that fall under the disciplinary areas contained or associated with the Faculty of Social Sciences, at present the largest faculty on the UWI St. Augustine Campus.

The IIR faculty and students are engaged in cutting edge, inter-disciplinary research projects that reflect the evolving nature of the global political economy and cover such areas as globalisation, multilateral diplomacy, regionalism, environmental issues and global governance.



The SALISES research agenda as part of an Institute that has a presence on the three UWI campuses, focuses on themes of poverty, money, finance and risk, governance and public sector reform and development theory and policy. The IGDS is an interdisciplinary Institute that has partnered with the faculty while maintaining relative autonomy.

The Department of Economics has a number of research clusters:

- The Sustainable Economic Development Unit (SEDU)
- The Labour Market and Poverty Studies Unit

(LMPSU)

- The Economic Measurement Unit (EMU)
- The Centre for Health Economics (HEU)

SEDU concentrates on research in the areas of economic valuation, vulnerability indices, social ecology, transportation, natural resources management, natural disasters and climate change, trade and the environment, poverty and sustainability livelihoods and sustainable tourism. Some of the main areas of concern for the LMPSU are the structure and earnings of informal labour and the working poor, youth, training and labour supply,

the measurement and tracking of poverty levels and the efficacy of poverty alleviation policies and programmes.

The Health Economics Unit was established in 1995 as one of the research clusters in the Department of Economics and is responsible for research, training and project-related activities in health economics areas including social insurance, poverty, health and sustainable development, equity, health policy and management.

The Department of Management Studies was fully launched in 1967. Selected research interests of staff and students include: Tourism development in small island states and more specifically, human resource development in the tourism industry in the region, the impact of tourism development on small island states, strategic brand management, information systems in business and society, the impact of information and communications technology on higher

education; finance and auditing management issues in performance measurement and information needs; small business electronic commerce and its impact on Caribbean business, corporate social responsibility and socio-ethical economy, professional and applied ethics.

Research in the **Department of Behavioural Sciences** seeks to acquire deeper insight into the basic processes that motivate human behaviour through the disciplines of Psychology, Sociology, Government and Social work. Two specialised areas of research also fall under the umbrella of this department, that of Mediation Studies and Criminology and Criminal Justice.

The following are selected themes of research covered under each of the disciplines or related area studies.

Psychology: Body image perception and its relationship to self-esteem and eating disorders using age, gender and ethnicity; psychology of media perception; social psychology of fear of crime, social



psychology of fear of gangs; nationwide study on the degree of conformity of social norms and values in Trinidad and Tobago and street children in the Caribbean.

Criminology: Crime statistics, analysis and policy action in Trinidad and Tobago; youth crime; prison recidivism in Trinidad and Tobago; reduction, rehabilitation and reform; reducing youth deviance in schools: building civil society and a healthy school model; baseline study of civic attitudes, psychological capital and school deviance.

Government: Caribbean local government in a context of good governance; Islamic discourse: the Jamaat-al-Muslimeen and the Jihad of July 27, 1990; Impact of the illicit drug trade on the political life of Trinidad and Tobago; institutional adaptation for democratic governance in multi-ethnic states public perceptions of parliament in Trinidad and Tobago, Dominica, Antigua & Barbuda and Western Cape - South Africa; game theory and public sector

reform in the Caribbean and a draft constitution for Trinidad and Tobago.

Sociology: Disability in Trinidad and Tobago; youth HIV/AIDS: crisis and opportunity in the Caribbean; ecumenical discourses in multi-religious societies; the involvement and characteristics of fathers on male adolescents' self-esteem in Port-of-Spain, Trinidad and Tobago; stratification in early childhood education in Trinidad and Tobago; drug abuse amongst adolescents in Trinidad and Tobago and alcohol studies related to the family in Trinidad and Tobago.

Mediation Studies/Social Work: Domestic Violence in Trinidad and Tobago: why women stay in abusive relationships; social services in Trinidad and Tobago; psychosocial Effects of HIV/AIDS on mothers and infants; cultural practices in mediation in the Caribbean; and the SONDAI Project: assessing psychosocial implications of HIV/AIDS in the Caribbean.



Onwubiko Agozino

Professor of Sociology



In 2006, Dr. Onwubiko Agozino was appointed a Professor in Sociology, already a leading scholar in the fields of sociology and criminology. His 2003 publication, *Counter-Colonial Criminology: A Critique of Imperialist Reason* (London, Pluto Press) was hailed internationally as charting a new direction in criminology. Some reviewers identified it as a major contribution to post-colonial criminology, to left-wing criminology, to the decolonisation perspective, as a contribution to black studies, or simply as a breath of fresh air. Other influential publications by Professor Agozino include the *African Journal of Criminology and Justice Studies*, which he founded as Editor-In-Chief for the African Criminology and Justice Association in 2005 and which he continues to edit for the association. His article in Sage Publishers' journal, *Criminological Theory*, in 2000, is listed by the publishers as one of the top 50 most cited articles in the journal. His co-authored publication, *Nigeria: Democratising a Militarised Civil Society* (2001, Centre for Democracy and Development, London and Lagos) was a finalist in the Global Development Network's contest on development research for which Professor Agozino was given all-expenses paid invitation to present a related paper at the GDN conference in New Delhi, India, 2004. At the time of his

appointment as professor by the UWI, he was acting as one of the International Council Members of the Centre for Democracy and Development (1997-2006). At UWI, he was appointed as Acting Head of Department of Behavioural Sciences (2006-2008), Coordinator of the Criminology Unit and Deputy Dean for Graduate Studies and Research (2008-2009).

An excerpt from Professor Agozino's doctoral dissertation at Edinburgh University (1995) was awarded the Mike Brake Memorial Prize in Radical Social Policy and Social Work in 1995. That dissertation made three original contributions to knowledge:

- 1) Agozino reconceptualised the data process as a process of data-reception rather than that of data-collection and urged researchers to acknowledge that they receive data as gifts from the people.

- 2) He clarified that victimisation is not punishment and that whereas criminologists tended to focus on the punishment of offenders almost exclusively, there was need to theorise the punishment of the innocent. This was based on his finding that black women were policed repressively during slavery, colonialism, apartheid and under the internal colonialism of inner-city London, not because they were offenders or suspects but because



they were proximate to suspected black men as their mothers, sisters, lovers or daughters and

3) Agozino advocated that policy should be defined more broadly to include areas where people themselves could take action to make the world a better place rather than follow the dominant orientation in the social sciences to make all policy recommendations to the state.

A perceptive commissioning editor at Ashgate Publishers decided to publish the thesis as a book offering him the bonus of being named as the Series Editor for the new series to be launched with his book. Professor Agozino continues to act as the Series Editor in *The Ashgate Publishers Interdisciplinary Research Series in Ethnic, Gender and Class Relations*.

As Professor of Sociology at UWI, Agozino continued his scholarly productivity and activism. He was awarded a Campus Research and Publications Fund grant for a documentary project on CLR James: *The Black Jacobin Sociology Series*, which was launched at the Cipriani College of Labour as part of the OWTU Annual CLR James Lecture Series, 2008 and was subsequently broadcast by NCC Channels 4 and 16, Trinidad and Tobago. One of the series of interviews (with Professor Gordon Rohlehr) was transcribed and published by *The Black Scholar* journal, co-author with the graduate research assistant and it was excerpted by *Encyclopedia Britannica* online. A second larger grant from the same Campus Research and Publications Fund resulted in *Shouters and the Control-Freak Empire*, a documentary on the outlawing and eventual liberation of the Shouter Baptist faith in Trinidad

and Tobago, and was broadcast on Gayelle Television as part of the Shouter Liberation Day, March 30, 2010.

A Government of Trinidad and Tobago researcher-initiated grant through UWI, St. Augustine, resulted in the Caribbean Criminology Network that involved collaboration with more than a dozen researchers on the campus and from the sister campuses under the direction of Professor Agozino. The activities of the network culminated in A Caribbean Criminology Conference that attracted participants from Europe, Asia, Canada, South America, US, and the Caribbean. Selected papers presented at the conference will be published in the *Caribbean Journal of Criminology and Social Psychology*. Professor Agozino was also invited to an all expenses paid workshop on gun violence at York University, Canada and the result was a major publication on gun violence in the Caribbean in the official journal of the British Society of Criminology in 2009 with a colleague from UWI St. Augustine, another from UWI Mona and another from Kings College London as co-authors. Another international collaboration of his with a colleague at the University of Pennsylvania resulted in a publication in the *Journal of Correctional Healthcare* also in 2009.

Professor Agozino occupies a Visiting Professorship in Applied Criminology at the University of Huddersfield, UK (2009-2014) and is now tenured as Professor of Sociology and Director of Africana Studies Program, at the Department of Sociology, Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, Virginia, USA.



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PUBLICATIONS

2003 Counter Colonial Criminology: A Critique of Imperialist Reason, London, Pluto.

1997 Black Women and the Criminal Justice System: Towards the Decolonisation of Victimisation, Aldershot, Ashgate, reprinted in 1998.

2009 Agozino, B. with Stela Lucia Volpe, 'Health Disparities in Correctional Institutions: Implications for Disparities in the Community' in *Journal of Correctional Healthcare*, July 25.

2009 Agozino, B. with Ben Bowling, Elizabeth Ward and Godfrey St Bernard 'Guns, crime and social order in the West Indies' in *Criminology & Criminal Justice*, Vol: 9(3): 287-305

Ann Marie Bissessar

Professor - Public Management
Department of Behavioural Sciences



From 1998 to 2010 the focus of my research has been on public sector reform and its impact on effective governance within the Caribbean region.

My present research adds to my doctoral research, completed in 1998. My doctoral research examined reform in four countries—Guyana, Trinidad and Tobago, Jamaica and Barbados and argued that reform tools and mechanisms and indeed many of the policies introduced by developing countries involve no more than large-scale policy transfer from the developed countries. While this allowed for reduced costs to many governments, the greatest challenge in adopting such policies and programmes is that they often do not take into consideration the unique environment or culture of the country into which they were being introduced.

The second major argument in my doctoral thesis—the first debate of its kind in the Caribbean, was that many of the countries under review still continue to adhere to the policies and programmes introduced by the departing colonial administrators. Similar to the arguments by scholars such as Lloyd Best, Girvan, Jones, La Guerre and Ryan, the contention was that the Caribbean was still under-developed since they did not or have not introduced policies or programmes that are suitable to plural or multicultural societies such as ours.

Most of my current research focuses around this

issue. To arrive at appropriate mechanisms, I have suggested in one of my articles, that these islands are, as termed by Fred Riggs (1966),—“transitional societies”. Many third world countries, are often caught in what Riggs termed as a prism. They cannot be referred to as ‘modern’, in keeping with the standards of countries such as the United Kingdom or the United States, but neither can they be referred to as traditional societies. Thus, one can expect to see systems and practices that are taken from abroad implemented in societies in which inherited kinship and family ties persist, leading to a certain degree of dissonance.

I explored the theme of dissonance in books published in 2007 and 2008. In an edited volume published by Cambridge Scholars Publishing, I looked at reform efforts throughout the world and demonstrated that while many developed and developing countries had introduced similar policies and mechanisms to reform their public sectors, the Commonwealth Caribbean countries were largely driven by external agencies such as the International Monetary Fund and the World Bank. This superimposition of policies often resulted in unsuccessful reform.

In my ten years at the University of the West Indies, I continue research in the area of macro as well as the micro perspectives of reform and governance. A number of my articles that have been published in major peer-

reviewed journals such as *Public Personnel Management*, *International Review of Public Administration*, *International Journal of Public Sector Management* among others, have examined the challenges of reforming Human Resources within the Public Sector in Caribbean countries, at the issue of discrimination, race and ethnicity and governance and the civil society.

Apart from my first book *Colonial Administration, Structural Adjustment and New Public Management* (School of Continuing Studies, 2001), a landmark publication that focused on the legacy of colonial administration, a second valuable contribution to this area of research was *The Crisis of Public Sector Reform in the Caribbean: An Analysis through the use of Game Theory* (2008). This book has broken major grounds on two dimensions. First, it comprehensively documents research efforts from 1935 to present in five countries—Trinidad and Tobago, Jamaica, St. Vincent and the Grenadines, Barbados and Guyana. Second, it attempted to answer the question that formed the basis of my discussion in my 1998 doctoral thesis. *Why did reform attempts attain such dismal success in many of these islands?* The book concluded that mechanisms and policies

had to be adapted to the environment and socio-economic structure of each country to be truly effective.

My on-going research continues to link reform and governance. Two edited books are currently in preparation. One is entitled *Governance is it for Everyone?* while the other is entitled *Implementation Challenges around the Globe*. In addition, with author John La Guerre, we are re-publishing a classic *The Politics of Communalism* with further research on Guyana and Trinidad and Tobago to look at the impact of communal and ethnic ties within these communities.

I am also returning to research on health care administration in the Caribbean. In 1999, in the department of Primary Health Care, my major research was on health care throughout the Caribbean.

The significant research that preoccupies me, however, is the area of regulatory reform in the Caribbean. I am currently engaged in a long-term research project scheduled for three to four years, at the end of which I expect to arrive at more appropriate regulatory policy prescriptions for third world countries such as the Caribbean.



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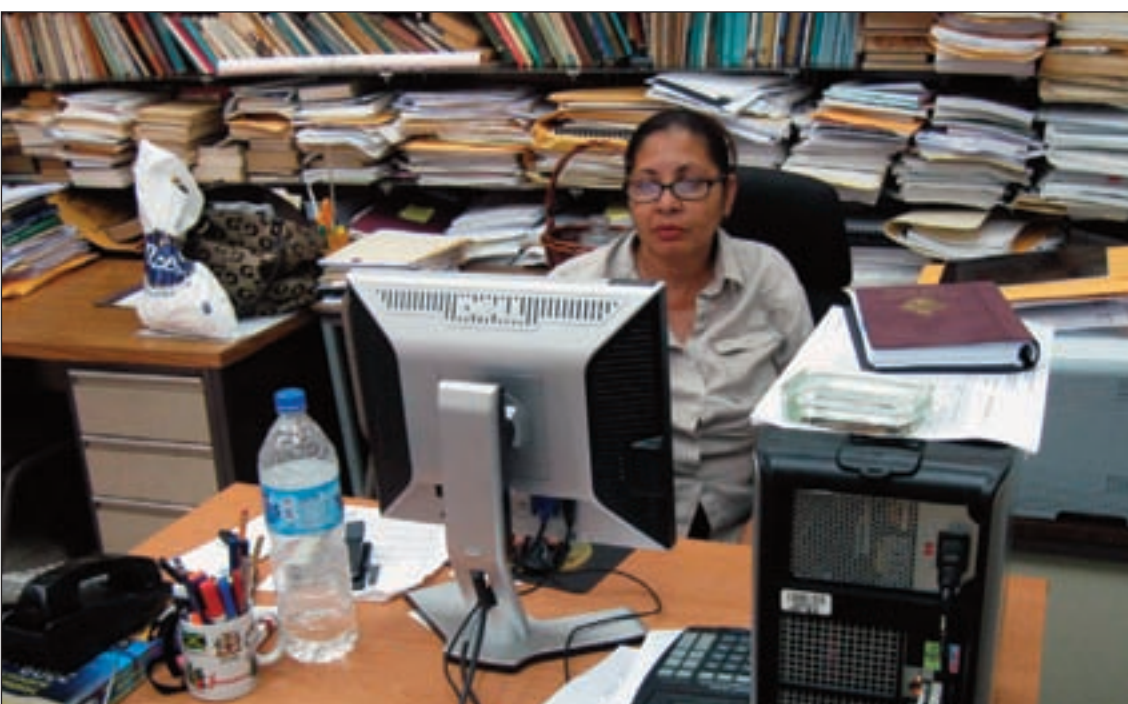
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Governance and Institutional Reengineering. Newcastle, UK: Cambridge Scholars Publishing, 2008, pp 275

Globalization and Governance: Essays on the Challenges for Small States (ed). McFarland and Company Ltd. 2004, pp 224

The Crisis of Public Sector Reform in the Caribbean: An Analysis through the use of Game Theory. Edwin Mellen Press 2008, pp 267



Norman Girvan

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My research has covered many issues in the field of the political economy of development. My doctoral thesis (the subject of a first book) concluded that Jamaica's rapid economic growth of the 1950s-1960s was not self-sustaining; partly because of the effects of multinational corporations in the natural resource (bauxite) sector and other sectors such as finance.

Subsequent work showed that corporate vertical integration of the multinational corporations inhibited the kind of integration of natural resource industries that the host economies needed for them to contribute meaningfully to economic development.

Comparative research on foreign-owned mining industries in Latin America led to a monograph on the copper industry in Chile, and a paper in which I showed the relationship between the structure and practices of multinational corporations and the persistence of dependent underdevelopment in mineral-export economies. This was also the subject of a second book that compared Caribbean dependency thought in the Caribbean, Latin America and Africa and resulted in a special issue of the *Journal Social and Economic Studies*.

At the United Nations Centre

As a research fellow at the United Nations Centre on Transnational Corporations, I continued the above research and was contributing author to the *Third Survey on Transnational Corporations and World Development* (1983); and author of a report on *Transnational Corporations and Non-Fuel Mineral Commodities*.

Another line of related research was on technology transfer and issues in technology policy. As coordinator of a multidisciplinary Caribbean Technology Policy Studies Project in the mid-1970s, I developed a conceptual framework of technological dependence, technological underdevelopment and technological dysfunctionality for interpreting the Caribbean situation, proposing policies to break the vicious cycle in a third publication that retains its relevance today. In addition, I directed a series of month-long training workshops on technology transfer and development in Africa and the Caribbean. My book with Kurt Hoffman distils the substance of what was learnt in this project, particularly the methods of capturing the attention of government decision makers for active technology policies by identifying measures where early pay offs could be generated. Technology issues formed the basis of guest lectures—The Arthur Lewis Memorial Lectures (2001) and the Surendra Patel Memorial Lecture (2005).

During the 1970s, I headed the Government of Jamaica's National Planning Agency, and co-authored

the People's Plan (1977), The Emergency Production Plan (1977-8) and the Five-Year Development Plan (1978-1982); as well as a number of studies of Jamaica's relationship with the International Monetary Fund.

Subsequently, as the Director of the Consortium Graduate School of Social Sciences in UWI Mona, the postgraduate multidisciplinary training programme in the applied social sciences, took me into several related subject areas. This included conceptual research in the meaning and application of multidisciplinary in the social sciences, the environment and sustainable development and social and community development.

My edited collection of the papers documented the extent to which innovative techniques of community development had been devised in Jamaica in the 1930s and 1940s and applied in several Latin American countries in the 1950s and 1960s.

Bottom-up development, which empowers local communities as the subjects of their own improvement, is the critical success factor in poverty elimination and social development, the subject of another edited book. A related piece of work was the thesis that Caribbean countries could be characterised as "societies at risk" and the need for a multi-dimensional, pan-Caribbean approach to regional development. I was appointed Professor of Development Studies in 1997.

In the 1960s, I did research on regional collaboration in the Caribbean Bauxite Industry. I continued research on Caribbean integration during my tenure as President and Executive committee member of the Association of Caribbean Economists (1987-1997) and as Secretary General of the Association of Caribbean States (2000-2004). Several Publications resulted including my most recent book *Cooperation in the Greater Caribbean*.

Caribbean focus

From 2004 onwards, my research focussed mainly on Caribbean economic integration and external trade relations, tracking developments in the CARICOM Single Market and Economy and the challenges of its completion; including the "Implementation deficit", the sovereignty/supernationality dilemma, the impact of economic differentiation on CARICOM decision-making, the reform of community governance; and the appropriateness of the chosen model of integration.

I was selected to be the coordinating author of the document *Towards the Single Development Vision and the Role of the Single Economy*, approved by CARICOM Heads of Government at their conference in July 2007 as the framework for the development for the Caribbean Community.

I continue to examine the Economic Partnership Agreement concluded between the CARIFORUM group of countries and the European Union: its development implications, its likely impact on Caribbean Integration and the lessons to be learnt from the EPA negotiations. I have argued that some lessons to be learnt from the negotiation are: the importance of 'critical decision points' in the course of negotiations; the role of ideology and of power in framing the parameters of negotiations; and the use of 'divide and conquer' strategies and 'carrot and stick' tactics by the dominant party in a relationship of asymmetrical power. This has resulted in several publications and research notes.

Recent research

My recent research on power and knowledge takes up some strands of my earlier work. I am revisiting *Caribbean Dependency Thought* and reviewing the work of the New World Group.

In a paper prepared for the United

Nations Reach Institute for Social Development UNRISD, I located the Caribbean search for policy autonomy in the Global South and the case for context-specific theories of development. These ideas were developed further in a paper on Power Imbalances and Development Knowledge prepared for the North/South Institute in Ottawa. I argue that the production and dissemination of international development knowledge can be conceptualised as a hierarchical system conditioned by North/South power imbalances in the military, economic and ideological spheres.

In 2005, I was elected Vice Chairman of the South Centre, an intergovernmental think tank of the South.

I am also a recipient of an Honorary Doctorate from the University of Havana (2008); was appointed to the United Nations Committee for Development Planning (2009); and appointed as the United Nations Secretary General's Personal representative in the Guyana-Venezuela Border Controversy (2010).



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PUBLICATIONS

Power Imbalances and Development Knowledge. Paper prepared for North-South Institute Project in Reform of the International Development Architecture, September, 2007. Available at http://www.nsi-ins.ca/english/pdf/Power_Imbalances.pdf

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Cooperation in the Greater Caribbean: The Role of the Association of Caribbean States.. Kingston: Ian Randle Publications, 2006; pp. 214.



Dennis Pantin

(Deceased 2010)

Professor - Department of Economics



Dennis Pantin founded and was Coordinator of the Sustainable Economic Development Unit (SEDU) based within this Department and he served twice as the Head of the Department of Economics. He received a BSc. Economics degree from UWI, St. Augustine and a M. Phil (Development Services) from the Institute of Development Studies, University of Sussex. He spent a year of scholarly leave at the Institute for Ecological Economics (USA) and the Centre for Social and Economic Research on the Global Environment, University College, London (UK), respectively, and an earlier period of study leave at the Institute for Environmental Studies, University of Toronto, Canada.

He conducted policy-oriented research on sustainable development related issues on several Caribbean countries including Belize, Jamaica, St. Lucia, Grenada, Guyana and Trinidad and Tobago. He published in regional and international journals and authored *Economics of Sustainable Development in Caribbean SIDS*. He was also the editor of the recently published *Reader in Caribbean Economy* (Ian Randle Publishers, Kingston, Jamaica, 2005). He was one of the co-authors of *The Economics of an Integrated (Watershed) Approach to Environmental Management in Small Island Developing States (SIDS): From Ridge to Reef* (UWI-SEDU/SIDS, 2008).

He served as the Chairman of the Regulated Industries Commission (RIC) of Trinidad and Tobago, the Organisation of Caribbean Utility Regulators (OCCUR)



and was a founding member of the T&T Economics Association (TTEA); the Association of Caribbean Economists (ACE) and the Constitution Reform Forum (CRF) of Trinidad and Tobago.

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In memory of Professor Dennis Pantin (1948–2010) we publish two tributes from students who worked closely with him in the Sustainable Economic Development Unit

The Prof we knew

By Malini Maharaj

Sir Arthur Lewis, a Nobel Laureate of Caribbean heritage is well known for saying that economics was “based on an understanding of the conditions under which people live.” It was not until I met Prof Dennis Pantin in 2003 that I saw this philosophy embodied in the passion and spirit of one person. I understood only then through his work, that money, fame and success meant very little if one was not concerned with what was happening around us—to our people, to our country and to our world. For Dennis Pantin, success was being able to change the harsh

realities that many are faced with, even if these circumstances changed only for one person at a time.

In Prof Pantin I found an open mind, a kind heart and a sometimes strange but brilliant perspective on life that opened for me a whole new meaning of the word “success.” Prof Pantin taught me that success was not selfish; it was not about recognition or fame but rather about affecting and improving people’s lives.

His involvement in environmental economics, in work on poverty and sustainable livelihoods, governance and constitutional reform, was not restricted to office hours at the University. He lived and

practised the teachings and philosophy of sustainable development, whether it was through refusing to buy bottled water because it contributed to waste and pollution, or printing on both sides of paper to save trees, and even sacrificing his Republic Day holiday to walk for Constitutional Reform!

Prof’s mind was as complicated as his handwriting, yet there was a simplicity that belied this academic genius that appealed to everyone, from the vendors around the Savannah, to the person sitting next to him in a bar, to the executive in fine couture, very unlike how Prof would invariably be dressed.

By Donna Ramjattan

I can't help but smile every time I reminisce on the huge piles of books and papers on his desk. Prof was quick to reassure me, "Don't worry, I know where everything is." He cleverly dismissed any notion that his office was disorganised by referring you to a poster stuck on his notice board with these words attributed to Albert Einstein: "If a cluttered desk signs a cluttered mind, of what, then, is an empty desk a sign?"

As a member of the Sustainable Economic Development Unit (SEDU), I recall whenever the team travelled to various Caribbean destinations for conferences and workshops, Prof would always make sure to enjoy the pleasures of the Caribbean. He would say "we can't be all work and no play!" His standard requirement of Caribbean hotels was that the beach must be within walking distance so that he could take a dip after the long meetings—he loved the beach. He enjoyed these simple pleasures and made you, as a Caribbean citizen, proud of the region's natural beauty.

Prof was notorious for his little black diary, his palm pilot in which he stored everything. His handwriting looked like hieroglyphics, yet even with his haphazard method of record-keeping, he always knew everything that was happening around him, everything!

Prof had a strong work ethic. Work hardly seemed

something that required deliberate effort as Prof would always remind us of a bigger purpose that involved what he and the SEDU stood for. He created something positive out of challenging circumstances—be it personal trials or even national economic crises. He had faith in us and in society—even when we lost faith in ourselves.

Everyone has a story; a life and a world uniquely crafted based on one's experiences. For many of us, Prof Pantin represents the defining chapter that lays the foundation for the rest of our stories. Through this experience we can only promise him that the legacy he has left with and in us does not end, but remains as undying as that undeniable spirit, that passion for life and that love for who we are and what we do. He will remain etched in our hearts and our histories.

Prof was an inspiration, a mentor, a best friend and, as all who ever met him would attest, a true, true Caribbean man. He instilled in us the values to work hard and play even harder, to treasure friends and family and to love life. There is no denying his love of culture. He knew how to make the word "lime" come to life. There was no job left undone without a good lime to top it off.

Prof, thanks for the memories. Your legacy will live on through the work of the SEDU and through your students.

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Ramesh Ramsaran

Professor - International Economic Relations



Professor Ramsaran's early work centred on the monetary and financial systems in the Caribbean in the immediate post-independence years and on subsequent efforts to modernise the financial infrastructure. The existence of underdeveloped money and capital markets in small open economies posed a particular kind of problematique for policy makers concerned with not only the construction of a regulatory framework, but also with having the financial sector play a supporting role to growth in the real sector.

Professor Ramsaran pioneered studies in offshore financial centres and his first major publication was *A*

Study of the Monetary and Financial System of the Bahamas (Mona: I.S.E.R., UWI, 1983). The study provided insights into the workings of a major offshore financial centre cum tax haven, and discussed the costs and benefits associated with such activities. The recent stances taken by the developed countries with respect to tax havens and offshore banking centres have greatly dampened the prospects for such activities as a viable development path, thus vindicating his earlier position that offshore banking and tax haven centres not only offered limited benefits, but rested on a very tenuous base.



Subsequently, he co-authored *Money and Finance in Trinidad and Tobago* (Mona: I.S.E.R., UWI, 1988), which explored monetary, financial and fiscal issues in a developing oil economy. The debt problem of the 1980s and the introduction of structural adjustment programmes to deal with the problem of stagnation and growth raised fundamental theoretical and policy issues, which he addressed in *The Challenge of Structural Adjustment in the Commonwealth Caribbean* (New York: Praeger, 1992). The introduction of SAPs in the 1980s by the World Bank and the IMF de-emphasized the role of state-led models of development and placed greater emphasis on markets to bring about economic transformation. Many observers felt, however, that SAPs were more intended to deal with issues of macro-economic stabilisation than with growth or the reduction of poverty.

With increasing innovations taking place in the global financial system and with the international monetary system becoming increasingly complex, there was a missing perspective in the literature for students from developing countries and Professor Ramsaran offered *An Introduction to International Money and Finance* (London: Macmillan Press Ltd. and New York: St. Martin's Press, 1999). Given the interdisciplinary nature of international relations and the special problems being faced by small states in a globalising world economy, Professor Ramsaran collaborated with a number of colleagues to produce several edited volumes in recent years.

Professor Ramsaran has had a great interest in the role of government in economic development, and has published widely on fiscal policy and the relevance of the fiscal infrastructure to development objectives. His work has covered areas relating to the responsiveness of fiscal systems, the efficiency of public spending, savings and investment policies, public borrowing issues, international capital markets and the operation of international financial institutions. Public debt remains a troubling issue for Caribbean states

given their inability to generate enough savings to finance the desired level of investment

Despite moderate growth rates and increases in per capita incomes over the last five decades, Caribbean economies remain vulnerable and highly open. The liberalisation of trade and investment, frequent crises in the global financial system, the failure of large financial institutions and the policy stance taken by the developed countries on governance issues have created a dynamic international environment that is particularly challenging to small countries. Professor Ramsaran's current research is focused on capital movements as they relate to foreign investment (short- and long-term), debt and aid. High levels of debt divert revenue and foreign exchange away from social programmes, and can therefore become very destabilising. Interestingly, the middle income status of Caribbean states debars them from accessing soft loans from certain sources. Despite more open policies towards foreign investment, this activity is still surrounded by a great deal of controversy with respect to benefits, impact on the exchange rate, effect on domestic savings and net foreign exchange flows. Yet in the neo-liberal paradigm foreign investment is seen as an important stimulus to growth and development.

The recent international financial crises in various parts of the world have revolved around financial institutions, debt and currency. Both developed and developing countries have been affected in one way or another. The contagion effect reflects the greater inter-connectedness of nations and the need for continuous monitoring of national and international developments. The easy movement of funds across national borders can wreak havoc with exchange rates and financial systems. Recent experience has shown that innovations in the global financial sector do not wait on official policy or legislation and offer a constant challenge to watchful and perceptive researchers such as Professor Ramsaran.



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PUBLICATIONS

Caribbean Survival and the Global Challenge (Kingston: Ian Randle Publishers, 2002).

Caribbean in the International Arena: The Implications of Global Instability and Conflict (San Juan: Lexicon Trinidad Ltd, 2003)

The Fiscal Experience in the Caribbean (St. Augustine: Caribbean Centre for Money and Finance, UWI, 2004)

Size, Power and Development in the Emerging World Order (San Juan: Lexicon Trinidad Ltd., 2006)

Timothy Shaw

Professor and Director
Institute of International Relations



As a first-generation Canadian, I was excited by the challenge of being associated with a new institution, university, country and region. I welcomed the opportunity of working in a 'democratic developmental island state'

Timothy Shaw

Professor Emeritus, University of London

Visiting Professor, Mbarara University of Science & Technology & Makerere University

Business School Uganda & Stellenbosch University, South Africa

Senior Fellow, Centre for International Governance Innovation, Waterloo, Canada

I delightedly accepted the demands of animating IIR in its fifth decade as its 13th Director; very aware of the big shoes I had to fill. As a first-generation Canadian, I was excited by the challenge of being associated with a new institution, university, country and region. I welcomed the opportunity of working in a "democratic developmental island state", having analysed development from the perspective of Africa/Canada/EU — from fragile to developmental states and now onto Small Island Developing States (SIDS).

I am privileged to possess degrees from a trio of continents: an opportunity that should now be open to all in the new millennium. Following working with Voluntary Service Overseas (VSO) in Thailand, I was President of the Student Union when the Institute of Development Studies (IDS) was established at the University of Sussex. My three decades at Dalhousie University in Nova Scotia included years teaching in universities in Zambia (UNZA), Nigeria (Ife, now OAU) and Zimbabwe (UZ).

Most recently, I was a faculty member in human security at Royal Roads University in British Columbia and was Director of the Institute of Commonwealth Studies at the University of Lon-

don. I continue to be a visiting professor in Uganda as well as in South Africa.

I'm now also a Senior Fellow at The Center for International Governance Innovation (CIGI) in Ontario, where I research issues like BRICSAM. I also continue to serve as a member of the Civil Society Advisory Committee to the Commonwealth Foundation, which organises the People's Forum in parallel to the Commonwealth Heads of Government Meeting (CHOGM) just held in Uganda and scheduled for Trinidad in 2009. Having recently completed a publication for Routledge on the Commonwealth, recently launched in Kampala around CHOGM and CPF, I'm pleased to continue to edit two-book series -on International Political Economy (IPE) from Palgrave Macmillan (over a quarter century) and the IPE of new regionalism from Ashgate. In addition to being a professor at Dalhousie University, at the University of London & at UWI, I have been visiting Prof in Denmark, Japan, Nigeria, Uganda, Zambia & Zimbabwe.

I continue to serve as Editor, International Political Economy (IPE) Series (www.palgrave.com/politics/ipe.asp) and IPE of New Regionalisms Series (www.ashgate.com/ipenr)



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PUBLICATIONS

Commonwealth: inter- and non-state contributions to global governance (Routledge, 2008)

Inter-American Cooperation at a Crossroads (Co-editor) (Palgrave Macmillan, 2010)

African & International Relations in the 21st Century: still challenging theory? (Co-editor) (Palgrave Macmillan, 2010)

The Ashgate Research Companion to Regionalisms (Co-editor) (Ashgate, 2010)

New Approaches to the Governance of National Resources: insights from/for Africa (Palgrave Macmillan, 2011)

Karl Theodore

Professor - Economics

Director, HEU, Centre for Health Economics, Department of Economics



Karl Theodore is the Director of the HEU, Centre for Health Economics at the University of the West Indies. He was awarded a B.A. and M.Sc. (Economics) from the London School of Economics in 1969 and 1971 respectively, and in 1984 was awarded his PhD. from the University of Boston. In 2001, he was appointed Professor of Economics, Department of Economics on the St. Augustine Campus, University of the West Indies, where he has taught Health Economics and supervised research in this area for many years.

His research interests include: Public Sector Economic Performance, Health Policy Economics, Social Security and Applied Economics. His contribution to field of research in the following two areas on which Professorship was granted. These are:

1. Health Economics research which included work on the Essential Health Service Package and on The Impact of HIV/AIDS in the Caribbean.

2. Public Sector Economics Research, which included work on Poverty and on Structural Adjustment

The Health Economics issues stimulated two major publications entitled, "Improving Health Status: Role of an Essential Health Service Package" and "HIV/AIDS in the Caribbean: Economic Issues-Impact and Investment Response".

The former paper highlighted the need to reorient health sector reform in the direction of improving the lot of the disadvantaged in our societies. In the sequencing of their health sector reforms it makes sense to give primacy to the financing elements if quality-of-life and equity of access are key objectives. The paper argued that in countries where poverty and inequity are major problems, it was necessary to phase out reliance on out-of-pocket payments and private health insurance, leaning more on a social insurance system supported by government revenues.

The second paper became the basis of work by Prof. Theodore for the 2001 WHO Commission on Macroeconomics and Health. The paper presented updated information on the estimated impact of HIV/AIDS on the economies of the Caribbean. He used the output of a 1997 joint UWI/CAREC study on the economic impact of HIV/AIDS in Jamaica and Trinidad and Tobago as the starting point and updated the projections for these two countries based on some of the underlying assumptions in respect of the epidemiology of the disease and the cost of treating infected people. Estimates were also derived for St. Lucia.

The estimated economic losses associated with the incidence of the disease were matched with the outlays on health and the stated development objectives of these island states. The study identified four channels through which the HIV/AIDS epidemic can have an impact on the development process and made the case that the epidemic had the potential to distort development. It quantified the level of resources that would be needed if the region is to adequately respond to the threat of this modern day plague.

The following projects illustrate Professor Theodore's ongoing research in the field of Health:

1. An "HIV/AIDS Tourism in the Caribbean Study" – a study undertaken for the United Nations Development Programme (UNDP).
2. "Comparative Analysis of The Impact of Chronic Disease Prescription Drug Programs in Jamaica and Trinidad and Tobago, 2003-2009" – Commissioned by the Inter-American Development Bank.

3. "Cost Efficiency at the Port of Spain General Hospital."
4. "On the Feasibility of Private Financing of Health in the Caribbean." Part of an Ongoing Study of Health Sector Financing.
5. "Health Expenditure and Economic Development in the Caribbean." A Health Economics Unit (HEU) Study of the Role of Health Policy in Development.
6. "The Economic Impact of HIV/AIDS on Households".

Among the papers that he has published on these subjects is "Estimating the Cost of Hospital Services in a Small Island State: A Case Study of the Milton Cato Memorial Hospital in St. Vincent and the Grenadines", *West Indian Medical Journal* vol.54, no.2, p.116-122, March. 2005, with Althea La Foucade.

To date, Professor Theodore has undertaken a wide range of public service activities throughout the Caribbean.

These include membership with: UNESCO (Project Assistant), Trinidad & Tobago's (T&T) Cabinet-appointed Fiscal Review Committee, Public Utilities Commission of T&T (Chairman), Caribbean Task Force on HIV/AIDS, Pan Caribbean Partnership Against HIV/AIDS (Partner/working member), PANCAP/CARICOM team for the formulation of a Regional proposal to the Global Fund for AIDS/TB and Malaria (GFATM) and NACC.

Additionally, he is a member of the following professional associations: International Society for Equity in Health (ISEqH), Council on Health Research for Development (COHRED), Trinidad and Tobago Economics Association (TTEA) and the International Health Economics Association (IHEA).

Professor Theodore has successfully supervised and continues to supervise several M.Phil. and Ph.D. students in the related areas of health economics and the impact of HIV/AIDS. Of significance, the first Ph.D thesis from the Department of Economics at St. Augustine was produced under his supervision.



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PUBLICATIONS

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"Employment, growth and social stability in a developing country", *Social and Economic Studies*, Vol. 58: 3 & 4 September/December 2009

"Informality in the Labor Market and Social Security", Chapter in *The Americas Social Security Report 2005: Labor Markets and the Fragmentation of Social Insurance; Financing for HIV/AIDS by Social Security*. Mexico: Inter-American Centre on Social Security. 2004 p.153-174.

Poverty Reduction Strategies: The Role of Health and Education. Washington D.C.: Pan American Health Organisation (PAHO), 1994.



Patrick Watson

Professor - Applied Economics

Director, Sir Arthur Lewis Institute of Social & Economic Studies



Patrick Kent Watson is Professor of Applied Economics and Director at the Sir Arthur Lewis Institute of Social and Economic Studies. He attributes his professorship to research done in applied economics, with reference to the Caribbean.

Using mainly econometric techniques, he has worked in areas such as the balance of payments, monetary and fiscal policy, savings, the measurement of capital stock, stock market efficiency and the informal sector.

His work has been published in journals including *Applied Economics*, the *International Economic Journal*, the *Journal of Development Studies*, the *Journal of Economic Studies*, *Journal of Applied Financial Economics* and *Social and Economic Studies*. He has also published chapters in edited books.

Publications

Books/Manuscripts Published/Edited

1. 1991. *Économie Politique Caraïbéenne*. ECONOMICA Publishing House, Paris, France, With F. Célimène.

2. 1996. Problems and challenges in modelling and

forecasting Caribbean Economies. Caribbean Centre for Monetary Studies, With S. Nicholls and H. Leon.

3. 2000. *Introductory Statistics*. (3 volumes). University of the West Indies Distance Education Centre.

4. 2001. *Empirical studies in Caribbean Economy*. Caribbean Centre for Monetary Studies, With Alain Maurin.

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Institute for Gender and Development Studies



Dr. Piyasuda Pangsapa, Head, IGDS

2011 marks the 18th anniversary of the Institute for Gender and Development Studies, formally, the Centre for Gender and Development Studies which obtained Institute status in 2008.

The Institute for Gender and Development Studies has a long history of involvement in regional, community and faculty research. The Institute's work is very much grounded in the realities and challenges that face women and men and, as a multi-disciplinary and interdisciplinary research unit, the IGDS has worked in collaboration with colleagues in other disciplinary locations. Generally speaking, the Institute's research profile reflects a concern with gendered issues that affect all areas of society and an aim to build gender consciousness and gender analysis skills in both research and policy in the Caribbean region.

The Institute's main research areas, spanning nearly two decades, reflect the Unit's interdisciplinarity and the diversity of expertise of its faculty. In the years following the establishment of the Centre in 1993, research was initially focused on: the constructions of Caribbean masculinities; areas studies on the diaspora; intersections of ethnicity, class and gender; and a project on island sustainability, livelihood and equity.

By 2000, these research areas were further extended into projects ranging from violence, manhood and masculinity in Caribbean history and literature; masculinity and crime to a gendered case study of an endangered

wetland in Trinidad and Tobago (the Nariva Swamp) that sought to examine the dynamics of male and female interaction with their bio-physical environment and natural resource use.

Other research projects include: the development of a gender, science and technology database; the launch of the women, gender and water project that looked at access to clean water as a major social and environmental issue; a study on male 'underachievement' and gender differentials in secondary and tertiary education systems in Trinidad and Tobago; and a research initiative that examines the influence of gender norms, expectations, behaviors and the associated power relations on sexuality and the implications for HIV/AIDS risk and prevention in Trinidad and Tobago.

In the last five years, the IGDS STA Unit has seen the expansion of research across the humanities and social sciences as part of an integrated regional research programme, *Gender in Caribbean Thought: Breaching Frontiers and Understanding Difference*, of the three campuses. Some of the groundbreaking research work under this broad theme range from cultural studies to gender, health and public policy making, all involving active engagement in community outreach. These projects include: *The Making of Feminisms in the Caribbean*, which aims to present a concrete response to the lacunae in the literature and history of Women's Activism and Politics; *Film, Image and Iconography of the Caribbean*,



which attempts to provide curricula material for courses in gender studies, creative arts, cultural studies and other Caribbean content courses; *A Different Imagination - Documentary Series*, which employs image to interrogate knowledge and ideas that have shaped the Caribbean; *Gender and Ethnomusicology - Reading Three Canal through Ethnomusicology and Visuality*, which engages in a reading of the music and videos produced by this talented Trinidadian group of musicians; *Breaking the Silence: A Multi-Sectoral Approach to Preventing and Addressing Child Sexual Abuse in Trinidad & Tobago*, which deals with the taboo subject of child sexual abuse /incest and its implications for HIV throughout Trinidad & Tobago by empowering children, parents, communities, policy makers, and service providers with the aim of reducing the prevalence of child sexual abuse/incest; *Building Responsive Policy: Gender, Sexual Culture and HIV & AIDS in the Caribbean*, which aims to produce knowledge of the sexual cultures of the Caribbean region and the implications for HIV/AIDS risk; and *Conceptualising Global Democracy*, which aims to explore how democracy can be understood and practised in relation to global issues; interrogation into the collaboration of nature and culture

in Caribbean development. Other research work include studies on: gender and popular culture; rethinking the Caribbean economy; transnationality and gender; gender and democracy; the autobiographies of women in science; gender, labour, migration and environmental issues in the Caribbean; and continuing work on: feminist theory and epistemology; gender politics and activism; gender mainstreaming in integrated water management in the Caribbean; gender and recreational water use; women and small and micro-enterprises in the Caribbean; women, politics and governance; gender-based differentials in Caribbean education systems; and gender, development and empowerment, which explores the possibility of new ways of thinking about, discussing and defining gender and empowerment and the limitations of empowerment in dangerous circumstances.

As a research unit founded on the understanding that social, cultural and historical processes have constructed and reproduced unequal gender relations within society, the Institute for Gender and Development Studies continues its mission of contributing to knowledge on gender-related issues in the Caribbean in the quest towards a more just and equitable world.



Patricia Mohammed

Professor - Gender and Cultural Studies
Chair, Graduate Studies & Research

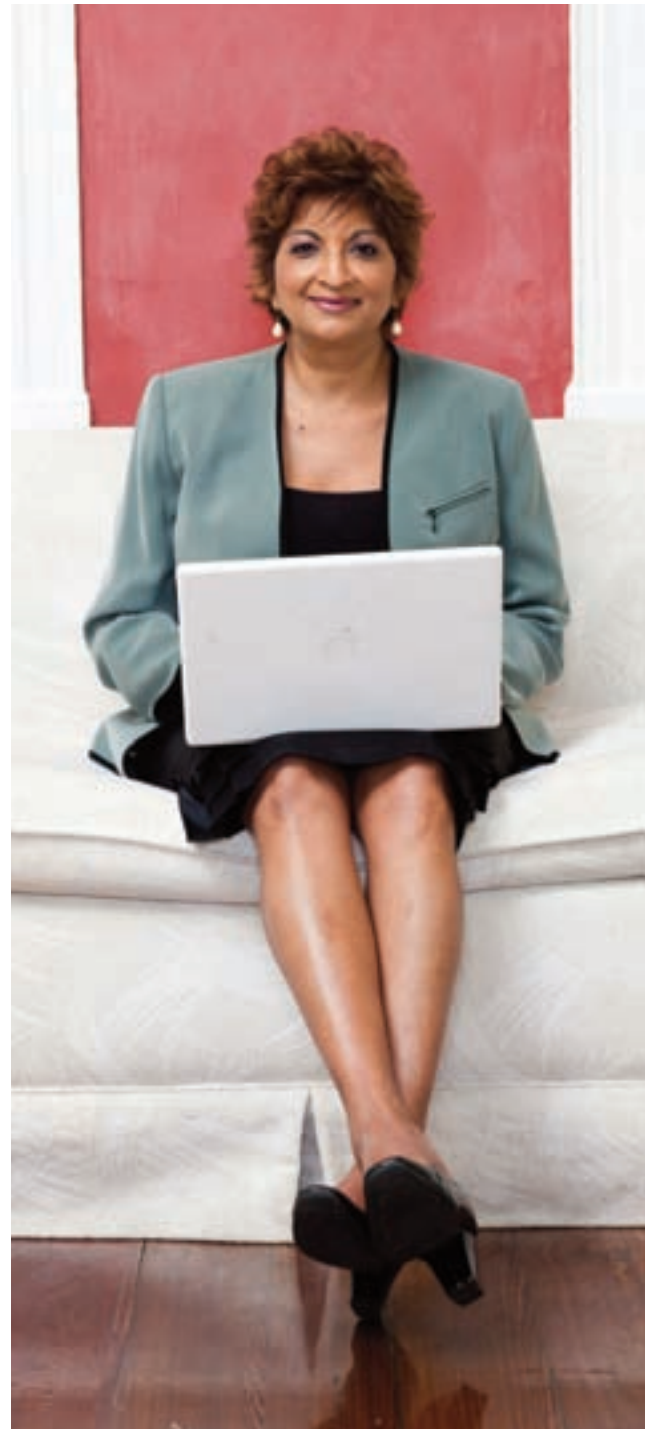


I was born into a society and region just emerging from colonial rule, grappling with the reclamation of sovereignty and identity. I grew tired of the old narratives of conquest, exploitation and victimhood. I came of age as a scholar when the new lens of gender added depth and complexity to considerations of ethnic, race and class biases in society.

My first major body of work thus concentrated on the intersections of gender and ethnic identity. *Gender Negotiations among Indians in Trinidad 1917 to 1947* (Palgrave, UK, 2002) recasts the gendered script that had been defined for Indian women and men in Trinidad, although the theoretical underpinnings of the work has wider relevance to understanding how gender relations are affected under conditions of migration or other societal disruptions. It argues that gender roles, and masculinity and femininity themselves are continuously negotiated under different social, economic and political circumstances and that patriarchy is itself is not an immutable concept or practice. Embracing history as the primary discipline though straddling sociology and anthropology, and in dialogue with feminist theory, the work contributes to the empirical knowledge of the post-migrant conditions of settlement of Indians into Trinidad. The legacy of an imbalance of male to female migrants had allowed women greater freedoms to challenge restrictive gender roles observed in India. Drawing on oral and conventional historical and sociological sources, the study dispelled the commonly held notion that Indian women were naturally passive and submissive to the will of parents and chosen spouse. It demonstrated that even within restrictive conditions where women themselves are collusive of cultural preservation, they negotiate changes for themselves and their children. It also examines the limits as well as challenges faced by masculinity to preserve tradition and privilege.

As a pioneering scholar in gender studies in the Caribbean, I recognised the need to publish material that would establish the epistemic code required for this interdisciplinary area of work in the region. *Gender in Caribbean Development* (1988) was the first reader in gender studies produced for the Anglophone Caribbean. A second publication was the guest edited special issue of the Routledge Journal Feminist Review: *Rethinking Caribbean Difference* (1998) and a third edited publication entitled *Gendered Realities* was published in 2001 by UWI Press, Kingston.

A consistent interface between activism and scholarly research and writing has also generated a body of work on national gender policies and the construction



of indicators of gender inequality for the Caribbean. Currently I am a gender specialist researcher in a major international action-oriented research initiative organised from the Centre for the Study of Globalisation and Regionalisation, University of Warwick, England entitled the Building Global Democracy programme (BGD).

Gender studies constantly forces a disciplinary promiscuity. Over the years I have attached a visual lens onto

I recognised the need to publish material that would establish the epistemic code required for this interdisciplinary area of work in the region. Gender in Caribbean Development (1988) was the first reader in gender studies produced for the Anglophone Caribbean.

Patricia Mohammed

the gendered textual one. *Imaging the Caribbean: Culture and Visual Translation* (Macmillan, UK, 2009) constitutes a second major area of research, writing, and increasingly filmmaking. This body of work on image and iconography invents another lens and grammar to view and interpret the Caribbean. It examines five hundred years of Caribbean history through the images produced for and about the region, re-casting the grand narratives of Enlightenment, conquest and colonialism from an insider perspective. In taking the visual as the primary medium for reading Caribbean culture, *Imaging the Caribbean* and other studies that are related to visibility I contest the primacy of writing as a way of organising and communicating knowledge.

As an educator, my interest is in packaging inherently complex ideas or long wave data into accessible formats that reach out to popular audiences and at the same time allow for in depth analysis.

To date I have directed or produced twelve documentary films and one short narrative film, some of which are related to gender, others to the field of art and culture. A documentary and experimental series of six short films *A Different Imagination* accompanies *Imaging the Caribbean: Culture and Visual Translation*. The fourth *The Sign of the Loa* views vodun as the source of Haitian creativity, the fifth, *Coolie Pink and Green* embraces the aesthetic brought by Asian populations in to the Caribbean.

To engage in filmmaking is to enter a collaborative field requiring knowledge of research, script writing, cinematography, editing, sound engineering, production management, marketing and distribution. The making of any film, as the making of any art form, as with the process of research itself, allows for a continuous sharpening of experience, skills and intellect that redound to the benefit of the institution.



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PUBLICATIONS

Imaging the Caribbean: Culture and Visual Translation, Macmillan, Oxford, 2009, 387 pp. 407 full colour image illustrations.

Gender Negotiations Among Indians in Trinidad: 1917-1947, Palgrave/Institute of Social Studies, London and The Hague, 2001, 319 pp. 2002

FILM

Seventeen Colours and a Sitar - Directed by Patricia Mohammed and Michael Mooleedhar, Experimental art documentary 35 mins 2010

Coolie Pink and Green, Director, Patricia Mohammed, Cinematographer Franklyn St. Juste, Editor, Michael Mooleedhar, Soundtrack, Sharda Patasar. Winner of the Most Popular Local short film, Trinidad and Tobago Film Festival, 2009. Screened at Opening ceremony of the First Pravasi Film festival in New Delhi, India



Professor Mohammed creates an image

Rhoda Reddock

Professor - Gender and Development Studies
Deputy Principal, Office of the Deputy Principal



My research interests have been inter-disciplinary and multidisciplinary, concentrated in the broad areas of socio-economic development, women, masculinities and gender. An emerging field where there was space to explore new scholarly directions, my work has related to the examination of women's labour and social movement history; the gendered implications of global economic development; gender, race/ethnicity and citizenship; feminist theory; environmental studies; gender and sexualities and Caribbean masculinities.

In the area of women's labour and social movement history my work was supported by involvement in co-ordinating a regional research project in the 1980s

while still a graduate student at the Institute of Social Studies, The Hague, on the History of Women's Movements and Organisations in the Caribbean.

That work created for the first time in the region an understanding that a women's movement existed in the Anglophone Caribbean since the late 19th Century and that Caribbean woman had been active in the labour movement since the post-emancipation period. This work, which involved collaboration with scholars in Jamaica and St. Vincent and the Grenadines, resulted in my doctoral dissertation and my first two self-authored publications and is a persistent theme in my ongoing publishing.



I feel there is much more to be done ... I am moved by the continuous quest to learn and understand more about the complexities of our society and its people and indeed about the region and the world.

Rhoda Reddock

In the early 1990s while still a research fellow at the Institute of Social and Economic Research (ISER) on the St. Augustine campus, I began work on the research theme – *Race, Class and Gender* in the Caribbean then part of a larger project on The Future of the Caribbean led by Prof. J. Edward Greene. This became and continues to be one of my major research interests.

I explore the specific ways in which inter-ethnic relations were constructed in multi-ethnic, post-colonial societies like Trinidad and Tobago. 11 research papers in this theme have been presented publicly or published as book chapters or journal articles.

The *Theorizing of Masculinity and Manhood* and its relationship to femininity and womanhood has become an important component in Caribbean feminist theorising. In 1996 I organized the first regional conference on Caribbean masculinities, which resulted in the edited book, *Interrogating Caribbean Masculinities* that brings together a multi-disciplinary range of essays from male and female scholars. One result of this conference was the formation of the Caribbean Network for Studies of Masculinities located in the University of Puerto Rico of which Patricia Mohammed and I were both founding members. As a result of the work in masculinities in the region, the UWI has become a Centre of Excellence in Masculinity Studies worldwide.

Multi-Disciplinary Collaborative research also forms a large part of my research profile. *Gender, Environment and Natural Resource Use*, which included the action-research project, *The Nariva Swamp: A Gendered Case Study*, funded by CIDA and CARICOM, was carried out in collaboration with Dr. Grace Sirju-Charran, plant biochemist of the Department of Life Sciences, UWI. A multi-disciplinary research team including five junior researchers drawn from agriculture, economics, political sciences/gender studies and ecology worked on this project.

This experience greatly facilitated their later careers as university academics, environmental experts, senior agricultural advisers, etc. Five research reports; two videos and two articles were produced.

A direct outgrowth of this project has been the Women, Gender and Water Programme still on stream at the Institute of Gender and Development Studies. In addition to academic publications, an important component has been work in communities, influencing public policy, social activism and the creation of public education materials including audio-visuals.

The second research area, Gender, Sexualities and the Implications for HIV began in 2004 with the involvement of several scholars drawn from law and medicine. Among other publications from this project is a preliminary qualitative study on Attitudes, Taboos and Behaviours related to Sexuality among Students at the UWI St. Augustine Campus.

Phase II of this project has focused on two tangents. One is the action-research project – *Breaking the Silence: Child Sexual Abuse, a Multi-Sectoral Approach* – is currently ongoing. The second project investigates sexual cultures in Trinidad and Tobago through an ethnographic study of Ariapita Avenue in Port-of-Spain and a qualitative study of sexual cultures among UWI students 18-30. These data are being analysed for future publication.

I feel there is much more to be done. My career is littered with unfinished projects that I hope to get back to but which I may need to convince graduate students to complete. I am moved by the continuous quest to learn and understand more about the complexities of our society and its people and indeed about the region and the world.

I would like to infuse this excitement about creating new knowledge and the joy of discovery in students and hope that I still have a few more exciting years of research, analysis and writing ahead of me.



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PUBLICATIONS

Elma François, *The NWCSA and the Workers Struggle for Change in the Caribbean in the 1930s*, New Beacon Books, London 1988;

Women, Labour and Politics in Trinidad and Tobago: A History, Zed Books, London, 1994 (CHOICE Outstanding Academic Book, 1996).

Rhoda Reddock, *Interrogating Caribbean Masculinities: Theoretical and Empirical Analyses*, The UWI Press, Kingston, 2004 (UWI Press, Bestselling Textbook, 2007)

Dorothy Roberts, Rhoda Reddock, Dianne Douglas and Sandra Reid (eds.) *Sex, Power and Taboo: Gender, Sexuality and HIV: The Caribbean and Beyond*, Ian Randle Publishers, Kingston 2009.







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