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Recognizing Outstanding Researchers

The UWI is deeply committed to the task of generating new knowledge for the benefit of the people of our region. We intend to improve our standard of living and transform the way we conduct business, so every research output that takes us closer to our goals is worthy of recognition.

This booklet, *“Research for Development: Recognizing Outstanding Researchers”*, is a compilation of those research activities that take us a little closer to the region we envision. The articles describe the research in simple, lucid language for everyone to comprehend. All the research projects described merit inclusion because they had to meet strict criteria established by each faculty, and had to demonstrate their superiority over the pool of other high quality submissions.

Recognizing our outstanding researchers is an irremovable fixture on the UWI's research calendar. Our research singularly provides one of the most powerful means of being responsive to the needs of our people and hence has the potential to have the greatest impact on the transformation of the region. Those who make this happen must be rewarded.

In the last two years the UWI, Mona has embarked on a multi-pronged method of ensuring the widest dissemination of the cutting-edge research conducted here for the benefit of the people we serve. This booklet is an effective prong in putting our research in the marketplace by providing easy access to it. This platform will put UWI researchers in touch with researchers around the world. Dissemination of our work facilitates the development of professional relationships and important collaborative activities with institutions where resources are greater than ours.

We remain fully engaged in the generation of knowledge, all for the enhancement of our reputation for high quality research and

Recognizing our outstanding researchers is an irremovable fixture on the UWI's research calendar.



Faculty of Humanities & Education



Dr. Sabrina Rampersad

Department of History and Archaeology

Who Were The First Human Inhabitants of Jamaica?

WHO WERE THE FIRST HUMAN INHABITANTS OF JAMAICA?

The first human inhabitants of Jamaica are virtually unknown to Jamaicans and to the wider world. They were not the Taíno peoples whom Columbus met here when he landed in A.D. 1494. There was an earlier and distinct cultural group—distinct by the fine-grained, red-painted ceramics they made and used—who initially populated Jamaica about two hundred years before Taíno groups ever set foot on Jamaican soil.

REDWARE PEOPLE

These original colonizers are known formally as the 'Ostionan Ostionoid' culture, but they are more commonly referred to as 'Redware' people because of their distinctive red pottery. Scholars first became aware of the existence of Redware peoples on Jamaica in the mid 1930s, when the north coast site of Little River (St. Ann) was discovered and investigated archaeologically; but since then, remarkably, no scholar has undertaken any systematic study with the aim of adding to the knowledge of these pre-Colonial people.

QUESTIONS ABOUT THE REDWARE PEOPLE

Still unanswered, are the questions of their origins, the nature of their demise (they 'disappeared' before the arrival of Columbus), their manners and customs, economic and dietary preferences, modes of habitation, manner of dress, social customs, political organization, religious beliefs and practices, and so forth. In, short, the lifestyles of these earliest Jamaicans are still a mystery to us. Fortunately, scientific dating of organic material from the Little River site has given us a date of A.D. 650 for



In 2007 Dr. Rampersad conceptualized and initiated the Blue Marlin archaeological project and headed into the field to begin collecting new and much-needed material evidence that would enhance our knowledge of the Jamaican Redware people.



the possible earliest arrival of these people onto the island, so there does exist a chronological starting point for new scholars interested in Redware culture.

UWI FILLS THE INFORMATION GAPS

In 2007 Dr. Rampersad conceptualized and initiated the Blue Marlin archaeological project and headed into the field to begin collecting new and much-needed material evidence that would enhance our knowledge of the Jamaican Redware people. It is important to realize that because they are a pre-Colonial people who had disappeared before the first Europeans arrived, they were never documented in any historic record—only archaeological investigation has the potential to reveal the hidden lifeways of these people.

LOCATION OF INTEREST

Dr. Rampersad targeted the Great Bay/Treasure Beach region of the south coast (St. Elizabeth) (Fig. 1), where Redware remains (pottery, especially) have been noted in abundance since the 1960s. There is little doubt that Redware peoples used this area of the island extensively, as the Blue Marlin site is not the only habitation found along the south coast. The scientific dates (radiocarbon) obtained from charcoal samples from the Blue Marlin site, indicate that Redware people were on the south coast somewhat later than on the north coast, but what this means for their overall use and exploitation of the island has yet to be determined.

WHEN WERE REDWARE PEOPLE HERE?

The Blue Marlin radiocarbon dates, occurring some two hundred years later than the Little River date, presents the exciting scenario that Redware people remained on the island long after their initial landing in A.D. 650. This is important because the Redware culture, by its longevity,

may well have laid the foundation for pre-Colonial life in Jamaica, and perhaps had considerable influence on how later Taíno life evolved. It is certainly not too early to speculate on the possible evolution of Taíno culture from that of the earlier Redware.

ANSWER TO QUESTIONS ABOUT THE REDWARE PEOPLE

To answer important questions about the Redware people, Dr. Rampersad is analyzing archaeological findings such as pottery fragments excavated from the Blue Marlin site in 2007 and 2008. Since the Blue Marlin site was a place of habitation, it is not surprising to see domestic types showing up amongst the ceramic assemblage, such as cooking pots with moulded handles, bowls of various sizes and shapes, small jars, and larger storage vessels. The researcher is also comparing these vessel types with the forms from Redware sites on other islands of the Greater Antilles, such as Puerto Rico and Haiti.

Dr. Rampersad is also conducting studies of the clay composition of the Blue Marlin pottery, to determine exactly how the clay was tempered in the mixing process. Ceramic clays have distinctive compositional signatures from region to region around the world, and if Jamaican Redware populations originated in Puerto Rico and/or Haiti, then they would have migrated with their ceramic 'recipes' intact. The sooner researchers can begin to match fabric types and manufacturing methods with other islands of the Greater Antilles, the closer scholars can get to the origins of Jamaican Redware culture.

Two other interesting data sets that she is studying are the shell artifacts recovered from the site, as well as the mammal, reptile, fish, and bird remains, which together comprise the faunal assemblage. All of these remains, shells included, indicate food resources these people exploited. The identification of specific species is the aim here, for determining the precise ecological zones that Redware people targeted.

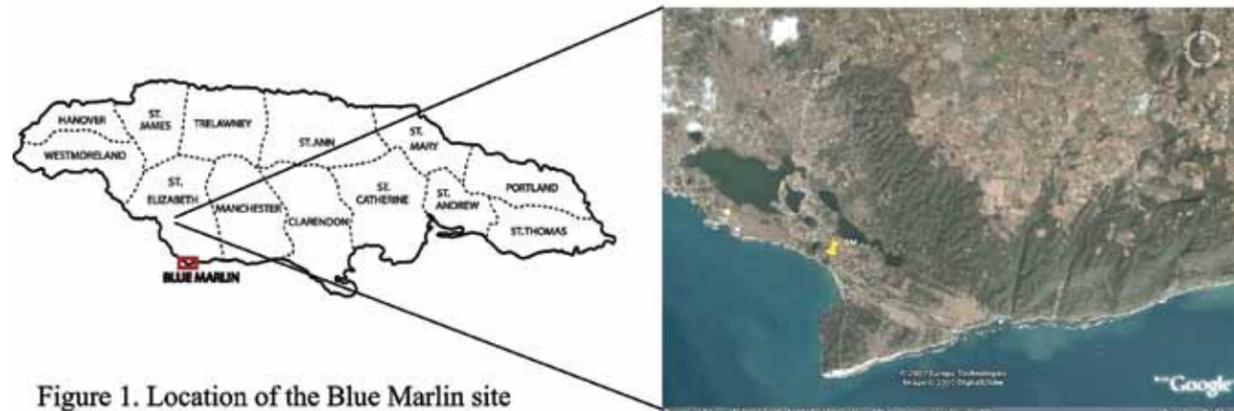


Figure 1. Location of the Blue Marlin site



There are some unexpected findings already, such as the scarcity of fish remains, indicating a minimum consumption of fish, in contrast with turtle remains; turtle appears to have been an important part of Redware diet.

IMPORTANCE OF THIS WORK

This work is important if we are to determine the origins of Jamaican Redware peoples, since present studies point to a series of east to west migrations of these peoples from Puerto Rico to Haiti, and lastly on to Jamaica.

These preliminary interpretations represent only the beginnings of the post-excavation studies on the Blue Marlin site. Although a long process, continued in-depth analysis of the material culture should further develop an understanding of Jamaica's first indigenous peoples. What is needed for the future is more survey and excavation of new Redware sites so we can better understand



larger issues, such as how widespread were the Redware populations across the island, and how, if at all, they interacted with the Taíno, who came along later in time. Only then can we begin to round out our knowledge of the many complex processes in Jamaican pre-Colonial history, and approach the level of cognizance that other Caribbean islands have gained of their respective prehistories.

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Dr. Matthew Smith

Department of History and Archaeology

Studying Haiti's Radical Past

Haiti holds great historical importance to the region for several reasons, not the least of which is its proud status as the first nation in the Caribbean to gain independence. It achieved this in 1804 following a hard-fought revolutionary war that began as a slave revolt.

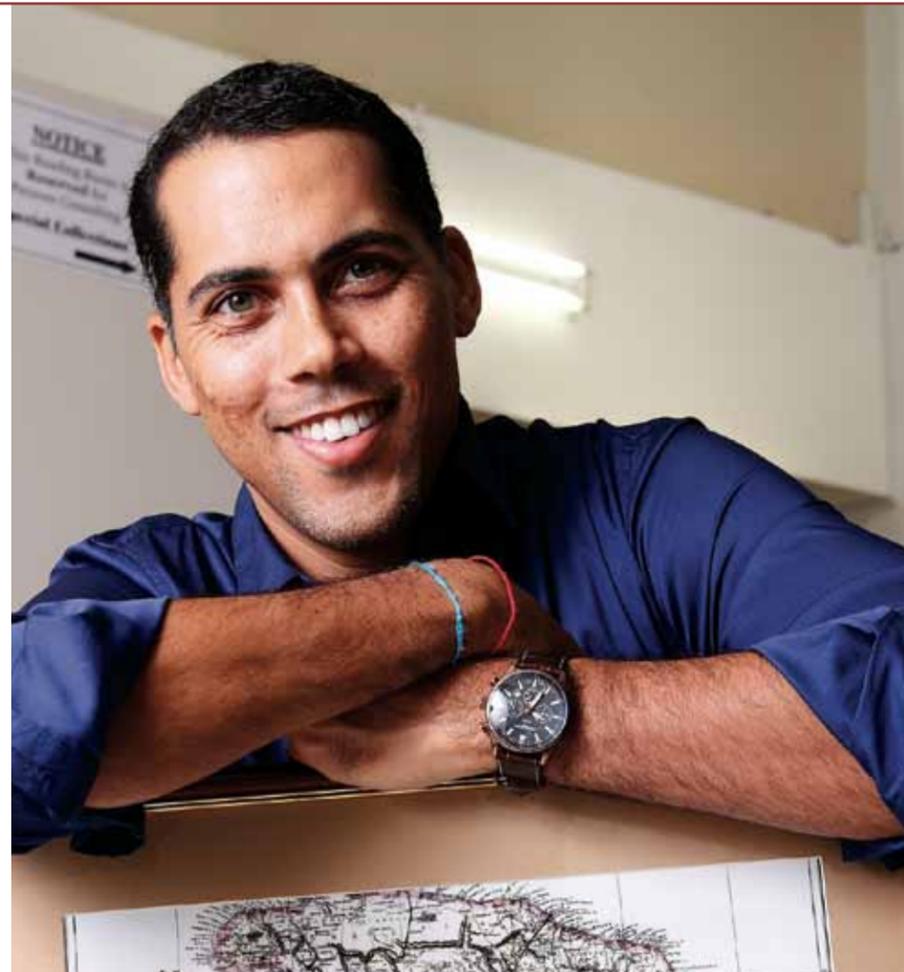
BLOODY BEGINNINGS

Since those bloody beginnings the country's history has been a source of controversy, misperception and neglect. Much of this is a result of the island's confusing politics, which makes it difficult to study. Although landmark periods in Haiti's history such as the Haitian Revolution, the Duvalier dictatorship and, more recently, the Aristide era, are familiar to many in the region, much is still unknown about Haiti's political history. Dr. Matthew J. Smith, an historian of Haiti, in an attempt to remedy this neglect decided to research on one of the important yet lesser known turning points in the country's political evolution: the post-occupation years between the end of US marine control in 1934 and the rise of the brutal Duvalier dictatorship in 1957.

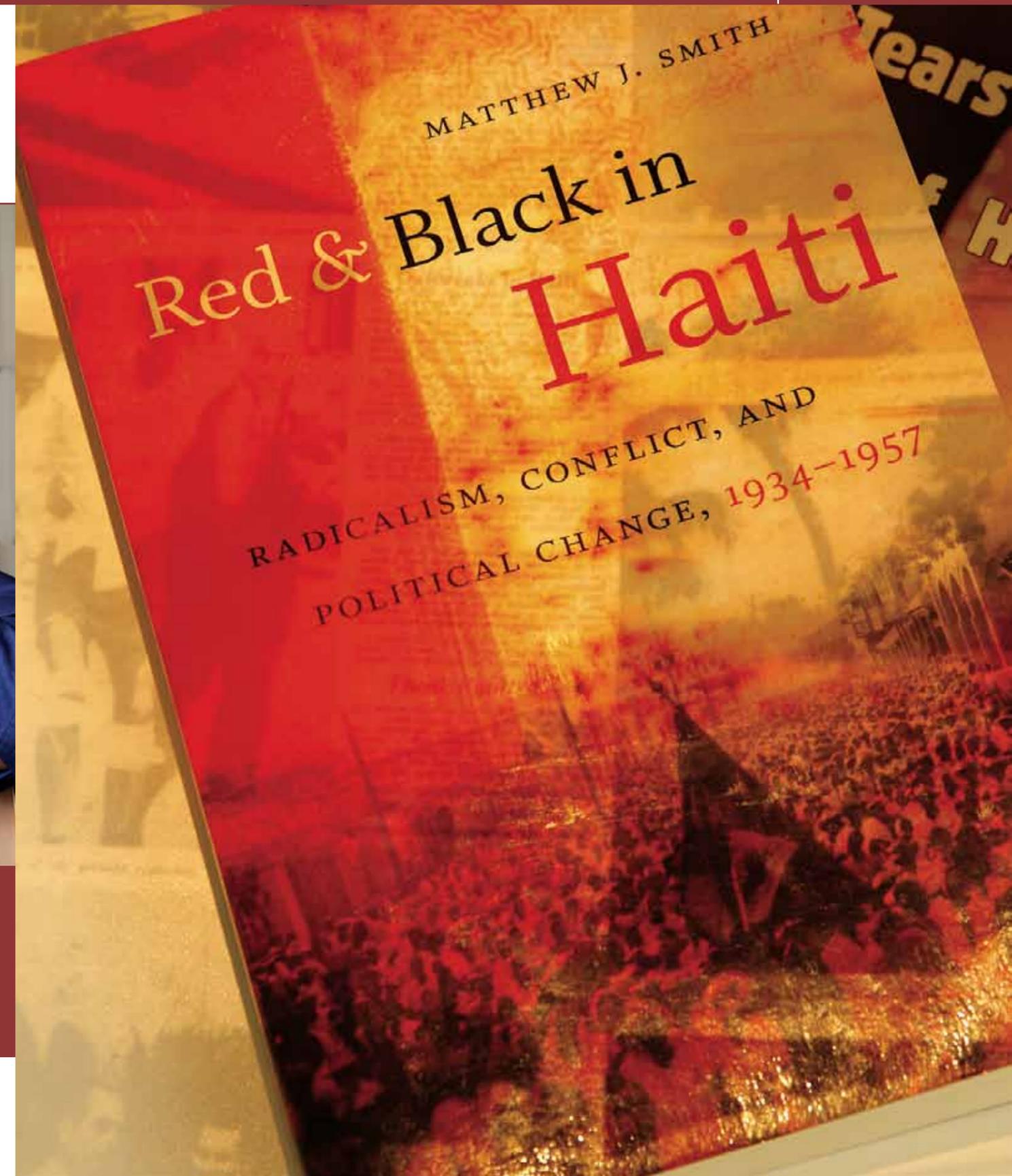
HAITI'S INDEPENDENCE

In 1934 the republic of Haiti celebrated its 130th anniversary as an independent nation. In that year, too, another sort of Haitian independence occurred, as the United States ended nearly two decades of occupation. In his book *Red and Black in Haiti*, the first comprehensive political history of post-occupation Haiti, Dr. Smith argues that the period (from 1934 until the rise of dictator François "Papa Doc" Duvalier to the presidency in 1957) constituted modern Haiti's greatest moment of political promise. This was a result of the strength of Haitian nationalism and the activism of political radicals who pushed for dramatic changes in Haitian society.

Red and Black in Haiti emphasizes the key role that radical groups, particularly Marxists and black nationalists, played in shaping contemporary Haitian history. These movements transformed Haiti's political



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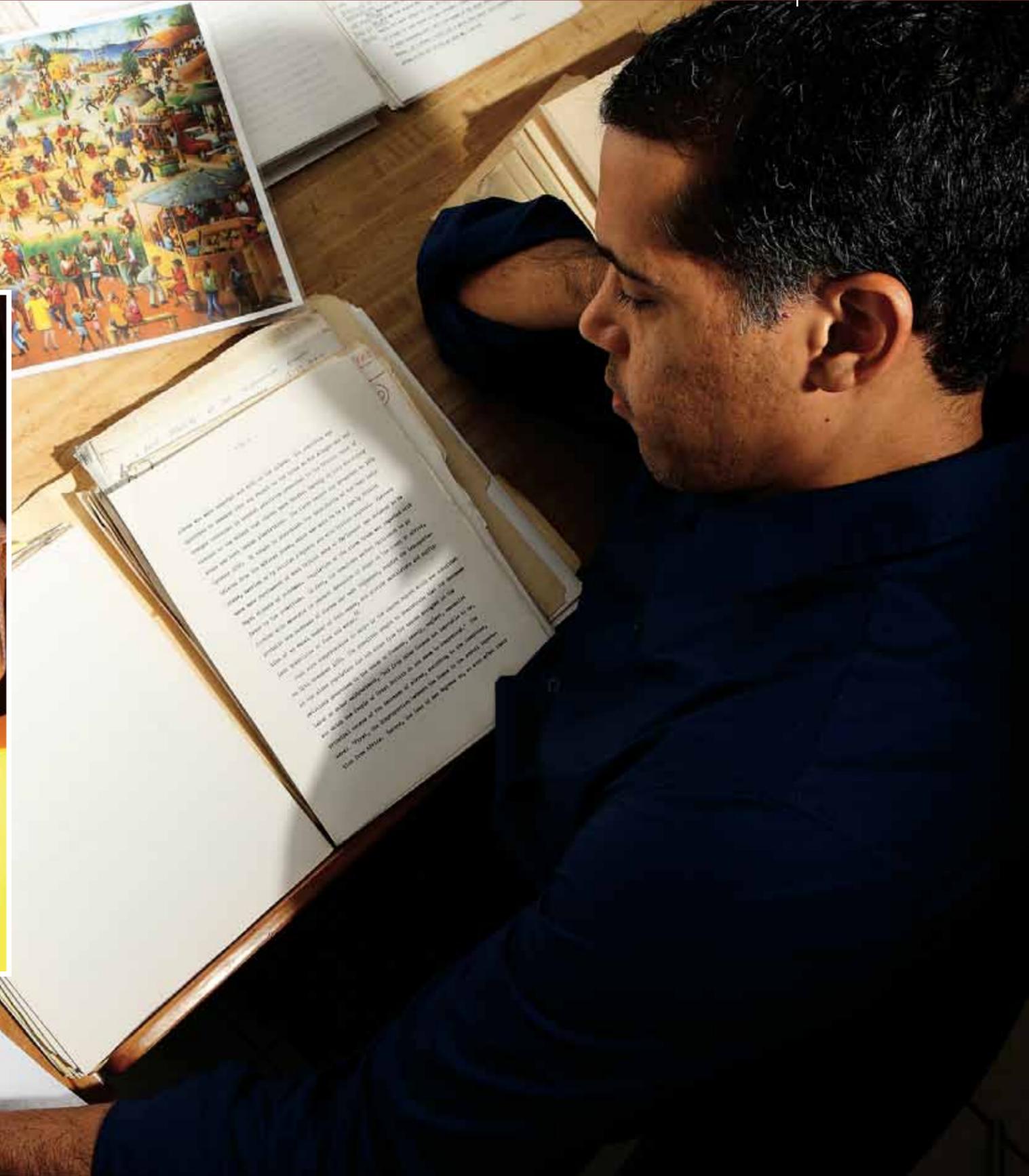
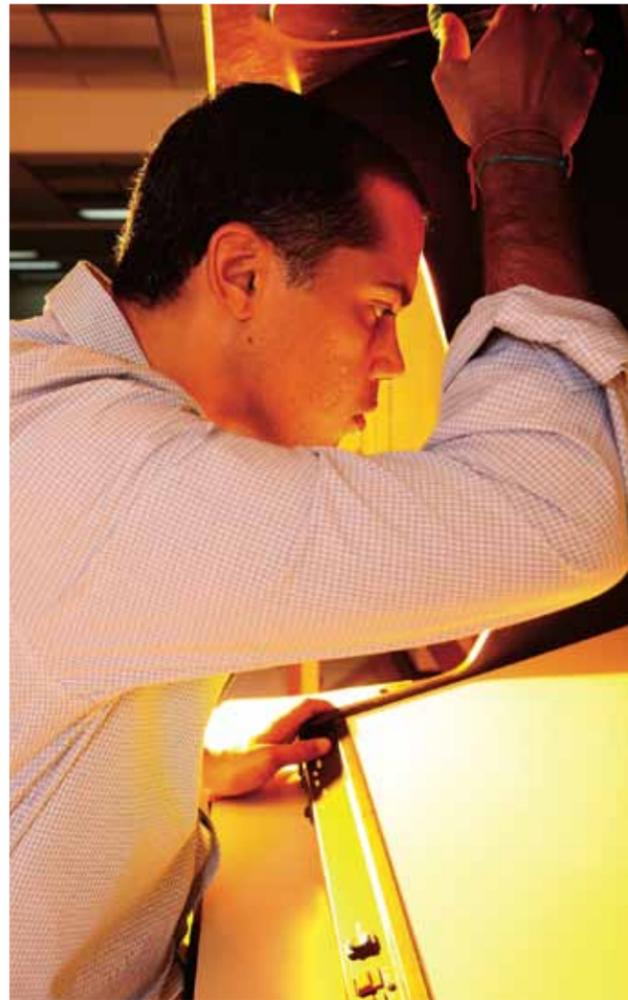
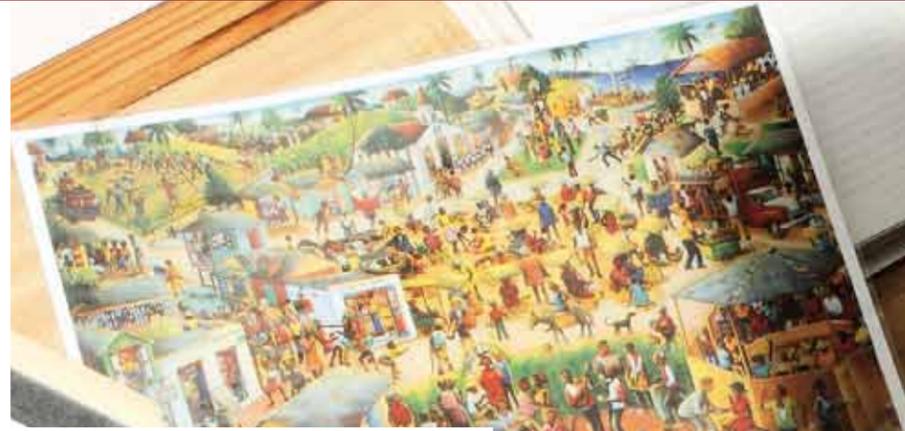


culture, widened political discourse, and presented several ideological alternatives for the nation's future. They were doomed, however, by a combination of intense internal rivalries, pressures from both state authorities and the traditional elite class, and the harsh climate of US anti-communism. Ultimately, the political activism of the era failed to set Haiti firmly on the path to a strong independent future. It nonetheless, formed a template for the protest and rivalries that continue to mark Haitian politics.

In building its argument, the book relies on a wide range of primary evidence, including Haitian, French and US sources (newspapers, memoirs, manuscripts, interviews with key figures of the era). These sources allow for a rich exploration of Haitian social and political life during those years. They were indeed exciting years for Haiti. A vibrant labour movement emerged and developed for the first time in the country's history; various economic programmes, such as tourism, were introduced; Haitian culture and art expanded enormously; a new nationalism took hold of the country; and the Haitian population became more politicized. The book examines in detail this golden era in Haiti's history, and explains why it was not sustained.

The story that *Red and Black in Haiti* tells is not unique to Haiti. Although the outcomes are different, the nature of post-colonial political competition in a Caribbean nation is quite familiar. In much of the region, decolonization brought with it the emergence of new leaders and ideas, each offering a different vision for the Caribbean. The post-occupation period in Haiti, between the 1930s and 1950s, not only defined Haitian politics, but also prefigured similar developments elsewhere in the region in later decades. Echoes of the Haitian situation can be found in the histories of its closest neighbours, particularly in the English-speaking islands after colonial rule ended in the 1960s and 1970s. The book also offers important lessons on how class, color, race, and contesting ideas of leadership, influence political futures in the Caribbean. *Red and Black in Haiti* illustrates the great value of comparing our history with those of our often forgotten neighbours. In so doing, the book makes a strong claim that the integration of regional histories is critical in any project of regional co-operation.

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The Caribbean Centre of Excellence in Teacher Training (CCETT)

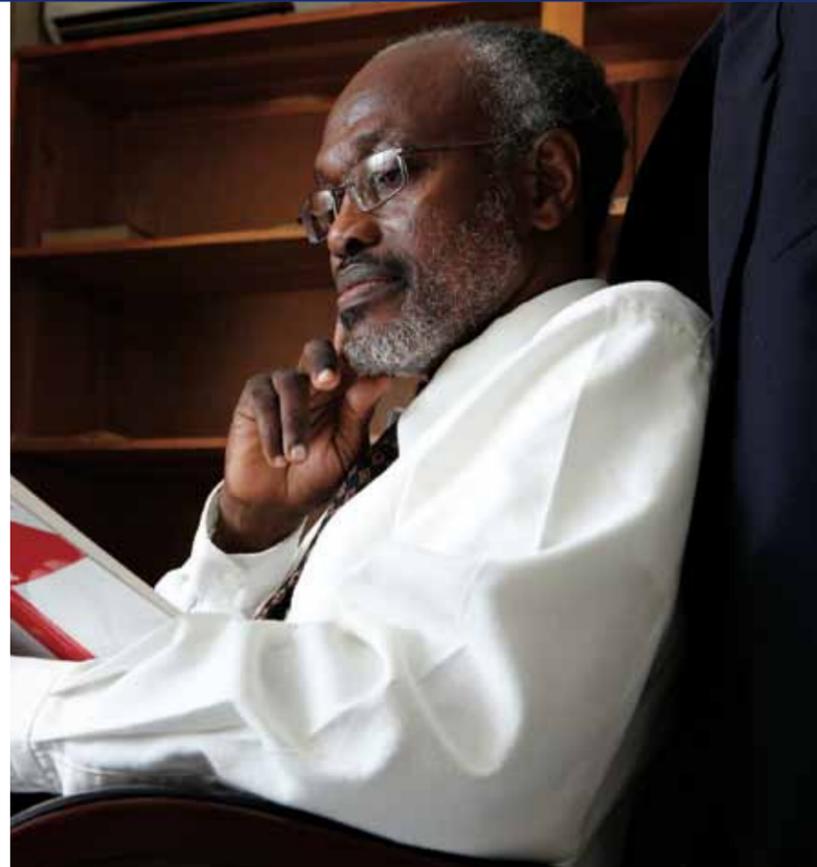
Professor Stafford Griffith
Mr. Delroy Alleyne
Mrs. Joan Hernandez
Mrs. Corrine Richards
Mr. Luke Jackson
Mr. Winston Kerr
Dr. Marcia Stewart

Helping Teachers & Students

The Caribbean Centre of Excellence for Teacher Training (CCETT) project was established in 2002 under an Agreement between the University of the West Indies, Mona Campus, Jamaica and USAID-Washington with the Institute of Education /Joint Board of Teacher Education (JBTE), Mona Campus as the Executing Agency. The project's overall aim was to improve the competence of teachers in literacy education in order to improve the literacy proficiency of students in the first three years of primary education. The project was effected through five critical components: diagnostic and performance assessment of children; development of teaching and learning materials; specialized training for reading specialists, teachers and principals; action research; development of information technology interactive platform. The project started in five countries (Jamaica, Belize, Guyana, St. Vincent and the Grenadines, St. Lucia.). Subsequently eight other Caribbean countries have come on stream (Anguilla, Antigua, BVI, Dominica, Grenada, Montserrat, St. Kitts & Nevis, Trinidad & Tobago) and have been implementing the CCETT approach in their primary education systems.

ACTION RESEARCH APPROACH

A key requirement of the project was that all interventions in schools be undertaken in the form of action research initiatives. These provided empirical data on the impact and effectiveness, and encouraged reflection on the meaning of the results in light of the objectives that the initiatives were seeking to achieve. Research findings were shared with teachers, Education Officers and University researchers. This was to ensure the creation of a learning community in the Commonwealth Caribbean with respect to the teaching of reading in the early grades, and lead to



The researchers tackled the problem by first improving the competence of the teachers in literacy education in order to upgrade the reading competencies of the students.





By the end of the first year in the programme, the "at risk" category was reduced from 80 percent to 41 percent while 26 percent of the students were reading just below grade level and those reading at or above grade level had jumped from 5 percent to 33 percent.

the development of new and more appropriate approaches to the teaching of reading as well as establish the applicability and effectiveness of existing strategies employed in the teaching of reading in the early grades.

PROJECT ATTRACTS IMPRESSIVE FUNDING

During the funding year 2008-2009, the CCETT project received a total of US\$1.973 million from USAID. These funds were used for the following activities –

- US\$1 million –for continuing the core CCETT activities in the five original CCETT countries (Jamaica, Belize, Guyana, St. Vincent and the Grenadines, St. Lucia). Dominica came on stream 2 years after to increase the number to six countries)
- US 500,000 million for carrying out special activities related to Dominica
- US\$ 473,000.00 – to carry out activities to assure sustainability in the future impact of the project, such as developing various standards for training of teachers and for teaching of literacy in Grades 1-3.

The initial CCETT project involved 68 schools, approximately 12000 students across the five original CCETT countries, 10 teachers colleges and five Ministries of Education.

IMPACT ON STUDENTS

The benchmarks for the outcomes of the project were to have 80% of students "Not At Risk" for reading failure and 60% reading at or above grade expectancy level by the end of Grade 3. This was based on the Caribbean Reading Standards Achievement Test (CRSAT). The results of the interventions implemented in all CCETT schools are indicated in Figure 1.

Figure 1

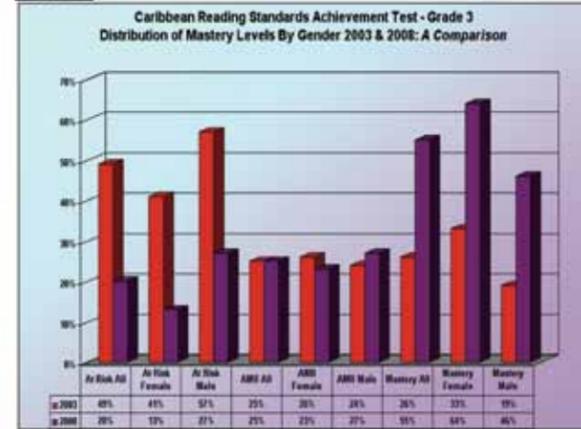
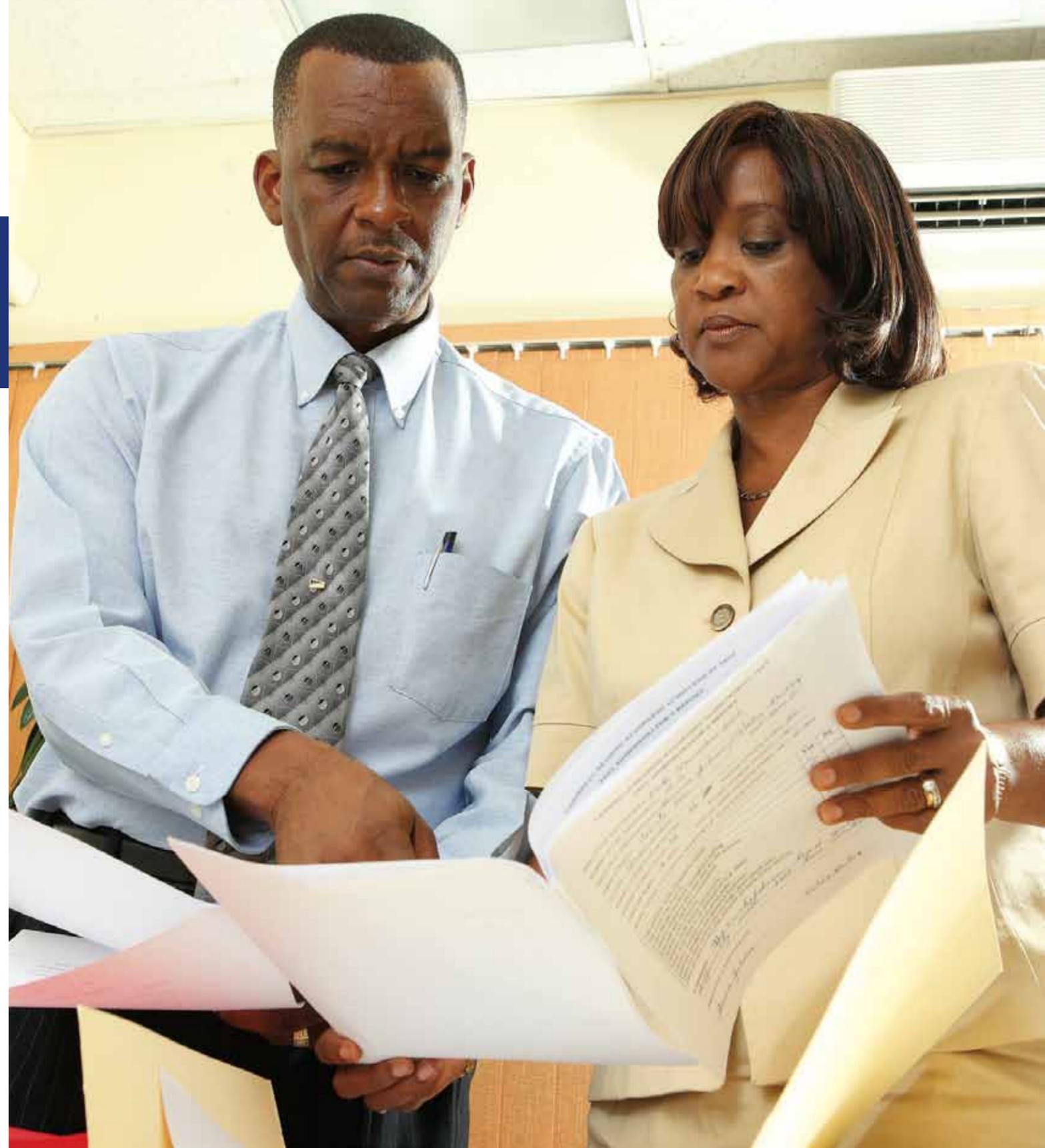


Figure 1 shows a comparison of Grade 3 student performance in 2003 on the CRSAT when the project began, and the research data collected and analysed in the final year, 2008 – 2009. The results show that the "At Risk" population in 2003 was 49% as compared to 20% in June 2009. By gender, females moved from 41% "At Risk" in 2003 to 13% in 2009. Males moved from 57% in 2003 to 27% in 2009. The benchmark of 80% being "Not At Risk" was, therefore, met in the 2008 – 2009 academic year.

The population of students who achieved "Mastery" in 2003 was 26% as compared to 55% in 2009. Females achieved the distinction of moving from 33% in 2003 to 64% "Mastery" in 2009, thereby surpassing the benchmark of 60%. Males moved 27 percentage points from a low of 19% in 2003 to 46% in 2009.





IMPACT ON TEACHERS' COLLEGES & TEACHERS

- Improved resources – each college had well equipped literacy centres established
- College students had benefit of hands on experiences by participating in administration of tests in the field; they learned how to administer standardized tests
- The Reading Specialists placed in each college continuously brought the lessons learned from the field into the college experience thus sensitizing the lecturers to the CCETT approach
- Teachers have learned how to utilize test results to inform their instructional approach. They have adopted an approach of “assessment for learning” rather than “assessment of learning”
- In almost all the countries, CCETT trained staff are being strategically placed in key positions in the Education system to help drive the CCETT methodology within the school system (e.g. St Vincent & the Grenadines, Belize, Guyana)

IMPACT ON PARTICIPATING SCHOOLS

- Teachers and principals participated in several CCETT workshops that improved the knowledge, skills and attitude of principals as instructional leaders
- Teachers were helped to master differentiated learning and ability to handle teaching in multi-grade classrooms
- All CCETT classrooms were transformed to more student – friendly, attractive and enriching places for learning. The Minister of Education, Belize commented that “When you enter a CCETT classroom you experience a tremendous difference”. All senior education policy makers in the CCETT countries have described the classrooms as “transformed”.

REGIONAL NETWORKING AND BUILDING OF LEARNING COMMUNITIES

- The uniqueness of the CCETT project is its regionality
- It provided rich interaction among the participating countries
- The regional and sub-regional workshops held each year provided opportunity for all participants to share and discuss their experiences
- Top performing teachers gained valuable exposure from being sponsored to attend the annual International Reading Association conferences
- CCETT trained teachers are being called on regularly to conduct workshops at International conferences, especially on multi-grade teaching

DEVELOPMENT OF STANDARDS

- Standards have been developed for reading and writing at the Grades 1-3 level. The process of development involved pulling together all the reading standards of participating countries and benchmarking these against the international standards. These standards have been endorsed by CARICOM, which continues work to have the standards accepted across the region
- Standards for the training of teachers of literacy for the primary grades 1-3 have also been developed and submitted to CARICOM for ratification. The process of development involved pulling together top regional specialists to develop the standards and benchmark them against International standards but paying special attention to the Caribbean language diversity.
- Some teachers colleges across the Caribbean have already reviewed and refined their own standards against the new Caribbean standards



EDUCOMM

Through CCETT, a state of the art video-conferencing system has been established at the JBTE, and linked to all CCETT colleges. This system facilitates training which can be conducted for multiple sites simultaneously. The impact of this has been significant reduction in the cost of travel to training workshops. It allows for rich interaction between participants without having to move them from their own locations.

A new USAID/Govt of Jamaica Project has indicated that the CCETT methodology and materials must be used in the project. The Jamaican Minister of Education has endorsed this and says he intends to use it in the education system.

Stafford Griffith, Chair, Research, Measurement and Evaluation in the Institute of Education, is the Director of the Caribbean Centre of Excellence for Teacher Training. He heads a team of technical specialists (comprising the Project Implementation Unit) most of whom are located within the Joint Board of Teacher Education, Mona Campus, with a smaller complement at the Cave Hill Campus.



Faculty of Medical Sciences



Tropical Medicine Research Institute

Dr. Michael Boyne
Dr. Carolyn Taylor-Bryan
Professor Franklyn Bennett
Mrs. Tamika Royal-Thomas
Professor Rainford Wilks
Professor Terrence Forrester

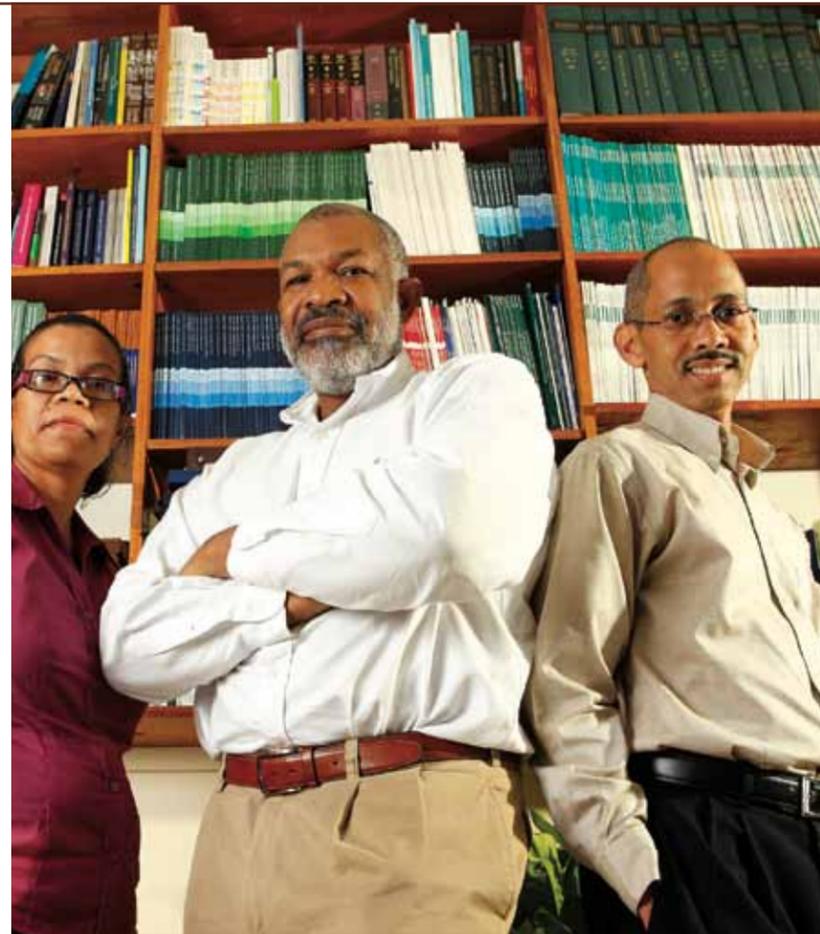
Cortisol Concentration is Associated with Blood Pressure in an Afro-Caribbean Population

HIGH OCCURRENCE OF HYPERTENSION-RELATED DEATHS

People of African origin have a high prevalence of hypertension, as well as high rates of hypertension-related deaths from stroke, heart disease and renal failure. Studies in Caucasian populations have provided evidence that excessive secretion of cortisol may contribute to the development of hypertension. Cortisol is a hormone that is secreted from the adrenal glands, especially during periods of stress. Hypertensive African Americans have higher late-night and early morning salivary cortisol concentrations compared to persons with normal blood pressure. Our research group previously showed that in Jamaican children, there were strong associations between morning cortisol concentrations and blood pressure. Consequently, we wanted to investigate this further.

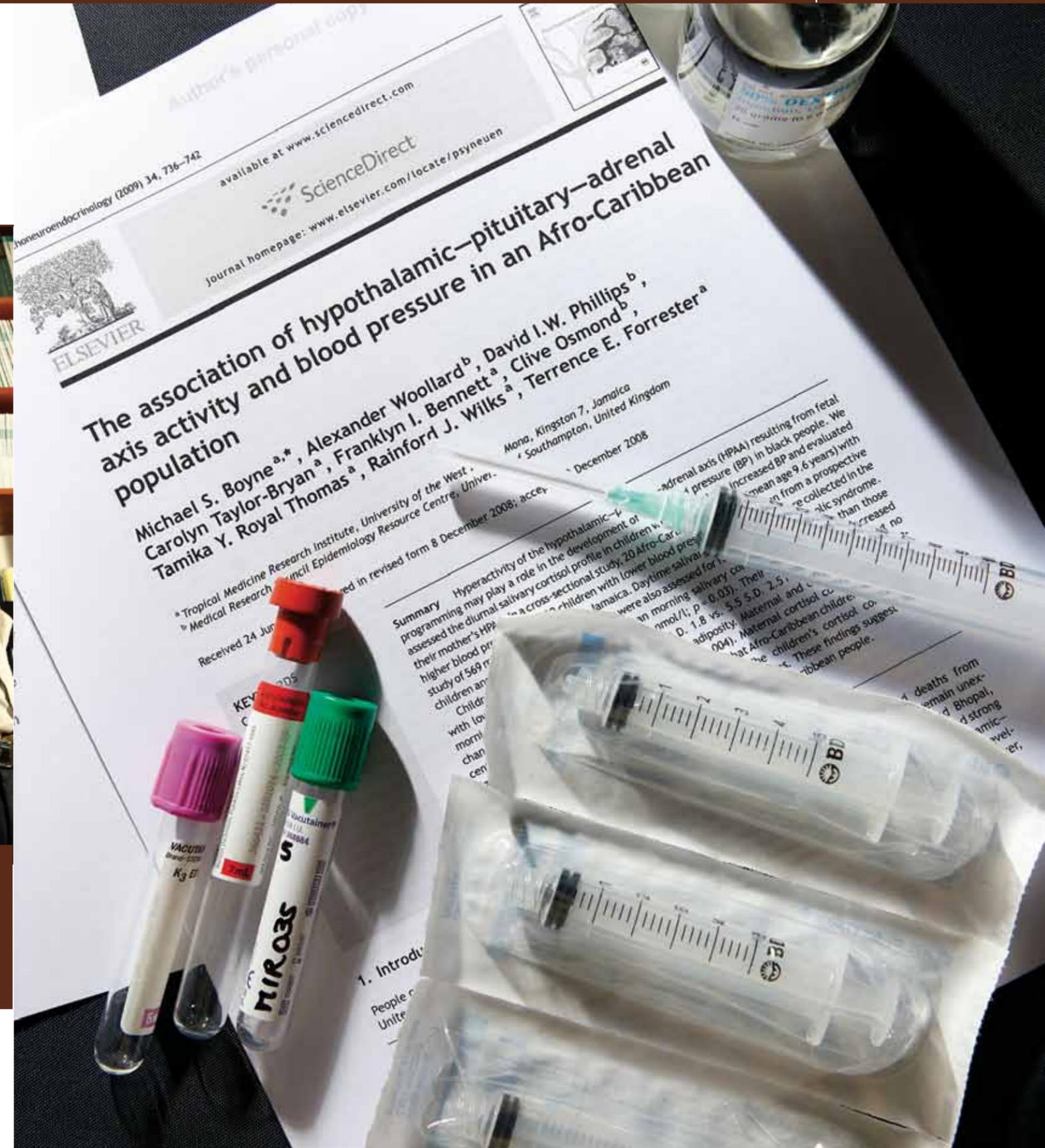
HOW COULD CORTISOL BE A CAUSE?

Elevated early morning cortisol concentrations could be due to chronic psychosocial stress or genetic factors. Importantly, however, they could be a result of "fetal programming." This phenomenon describes how growth within the womb and during infancy/childhood can influence someone's metabolism, and thus their risk for chronic diseases in later life. In animal studies, high cortisol levels from the mother lead to the birth of growth-retarded offspring, who in turn secrete more cortisol throughout their life. These effects may persist over several generations. Although this mechanism is well described in animal models, it is as yet poorly described in humans.



Taylor-Bryan | Forrester | Boyne

Hypertensive African Americans have higher late-night and early morning salivary cortisol concentrations compared to persons with normal blood pressure.





Our research group previously showed that in Jamaican children, there were strong associations between morning cortisol concentrations and blood pressure. Consequently, we wanted to investigate this further.

However, mothers with elevated cortisol levels during pregnancy, especially if they are stressed, have growth retarded offspring. Other studies have shown that growth-retarded babies have high cortisol secretion in childhood, and raised blood pressure in adulthood.

STUDY DESCRIPTION

Afro-Caribbean populations have historically experienced high rates of poverty and have lower birth weights. They might therefore be expected to show evidence of the enhanced operation of this mechanism. We have therefore carried out a case-control study nested in an ongoing prospective cohort study of 569 mothers and children in Kingston. We compared the cortisol levels of the mothers of 20 children with blood pressures at the upper end of the distribution with the cortisol levels of mothers of 20 children with blood pressures at the lower end. These children

were not known to be growth retarded during pregnancy. We measured the cortisol levels in saliva of the children and their mothers at 8 AM, 12 noon, 4 PM and 10 PM. Since blood pressure is strongly associated with the metabolic syndrome (i.e. type 2 diabetes, hypercholesterolaemia, obesity), we also evaluated the mothers for the presence of the metabolic syndrome.

RESULTS

Children with higher blood pressure were 390 grams lighter at birth and their morning cortisol levels were 76% higher than children with lower blood pressure. Their mothers also had morning cortisol levels that were 80% higher. There were no differences in fasting glucose, insulin, cholesterol, blood pressure or body fat between the two groups of mothers. There was a significant correlation of the cortisol levels in mothers and their children. Also, cortisol levels in the mothers were significantly associated with the children's blood pressure. These associations were not affected by the mother's socio-economic status.

CONCLUSIONS

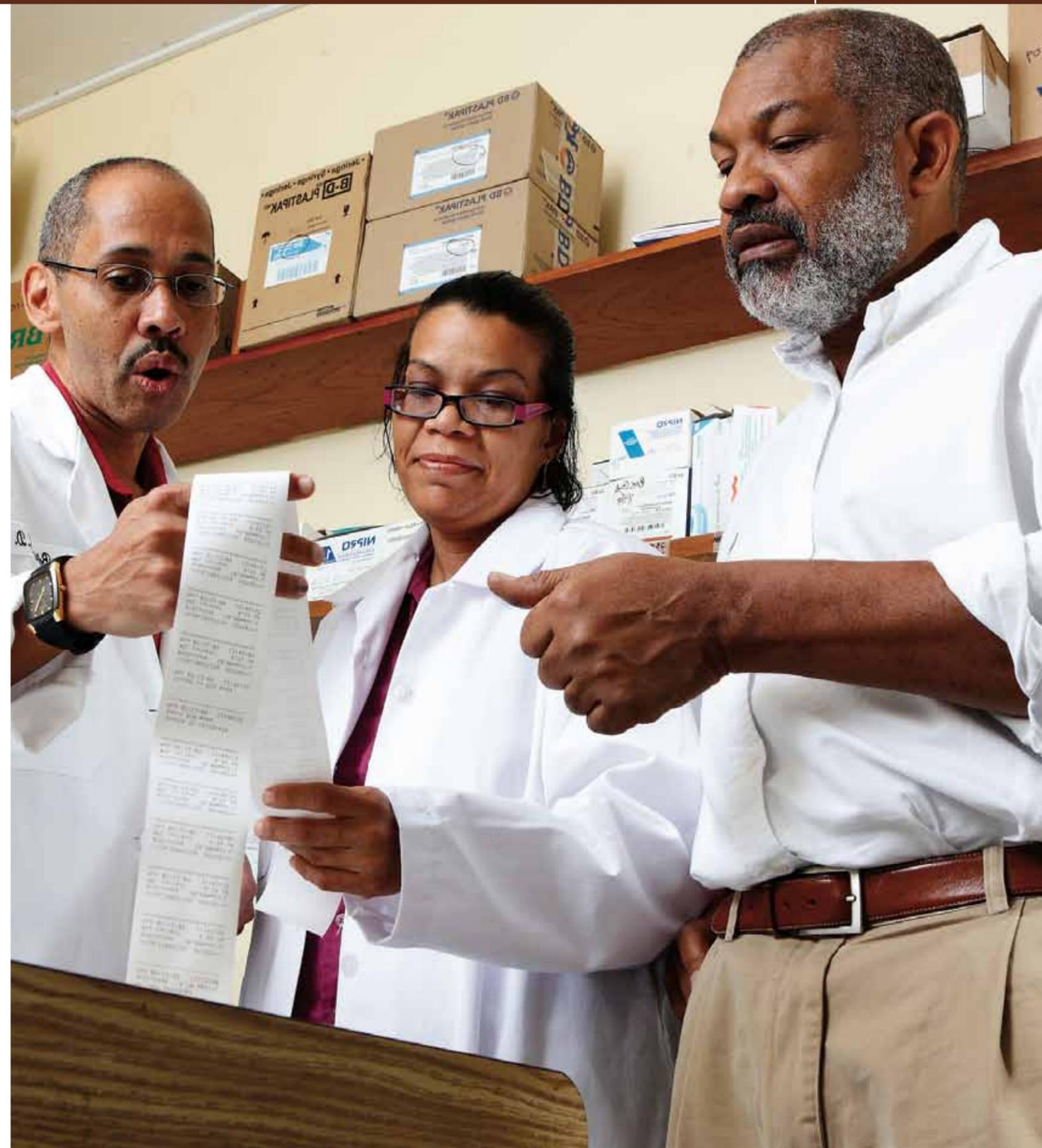
We concluded that Afro-Caribbean children with higher blood pressure have higher morning salivary cortisol levels. The children's cortisol levels correlate significantly with the mother's cortisol levels indicating a possible intrauterine origin. These findings suggest that the cortisol may play a role in the development of raised blood pressure in Afro-Caribbean people. These results raise interesting hypotheses on the origins of hypertension which need further investigation.

FUNDING

Caribbean Health Research Council provided the funds for this project.

Members of the research team are: **Michael Boyne, Alexander Woollard, David Phillips, Carolyn Taylor-Bryan, Franklyn Bennett, Clive Osmond, Tamika Royal Thomas, Rainford Wilks** and **Terrence Forrester** of the Tropical Medicine Research Institute, University of the West Indies, Mona, Jamaica and Medical Research Council Epidemiology Resource Centre (A.W., D.I.W.P., C.O.), University of Southampton, United Kingdom.

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Breast Cancer Surgery

Breast cancer surgery has two distinct components. First, there is surgery on the breast itself to remove either the entire breast (mastectomy) or the cancer with a margin of normal tissue (partial mastectomy or lumpectomy). The second component involves removal of lymph nodes from the axilla or armpit on the same side (axillary lymph node dissection – ALND), to which breast cancer usually spreads first. ALND is very important if the cancer has spread to the lymph nodes because it removes involved nodes and also provides valuable information to the Oncologist to help determine which patients will benefit from chemotherapy (and radiotherapy).

THE PROBLEMS WITH AXILLARY LYMPH NODE DISSECTION

ALND does not benefit patients whose cancer has not yet spread to the axillary lymph nodes. Before the introduction of sentinel node biopsy, ALL patients with breast cancer had a complete ALND performed because surgeons had no way of knowing in advance whether a patient's lymph nodes were involved or not. This meant that a large number of patients, who did not need ALND were having it done and were therefore at risk for the side effects of ALND without standing to gain any benefit from the procedure. Side effects of ALND can significantly impair quality of life and include permanent swelling of the arm (lymphedema), chronic shoulder and axillary pain, numbness and other paraesthesiae (abnormal sensations, such as sticking pain).

THE SOLUTION

What was needed was a way for surgeons to be able to predict whether the lymph nodes in the axilla were involved by spreading breast cancer or not. If a way could be found to do this, then ALND could proceed in those patients with lymph node spread and avoided in those without.

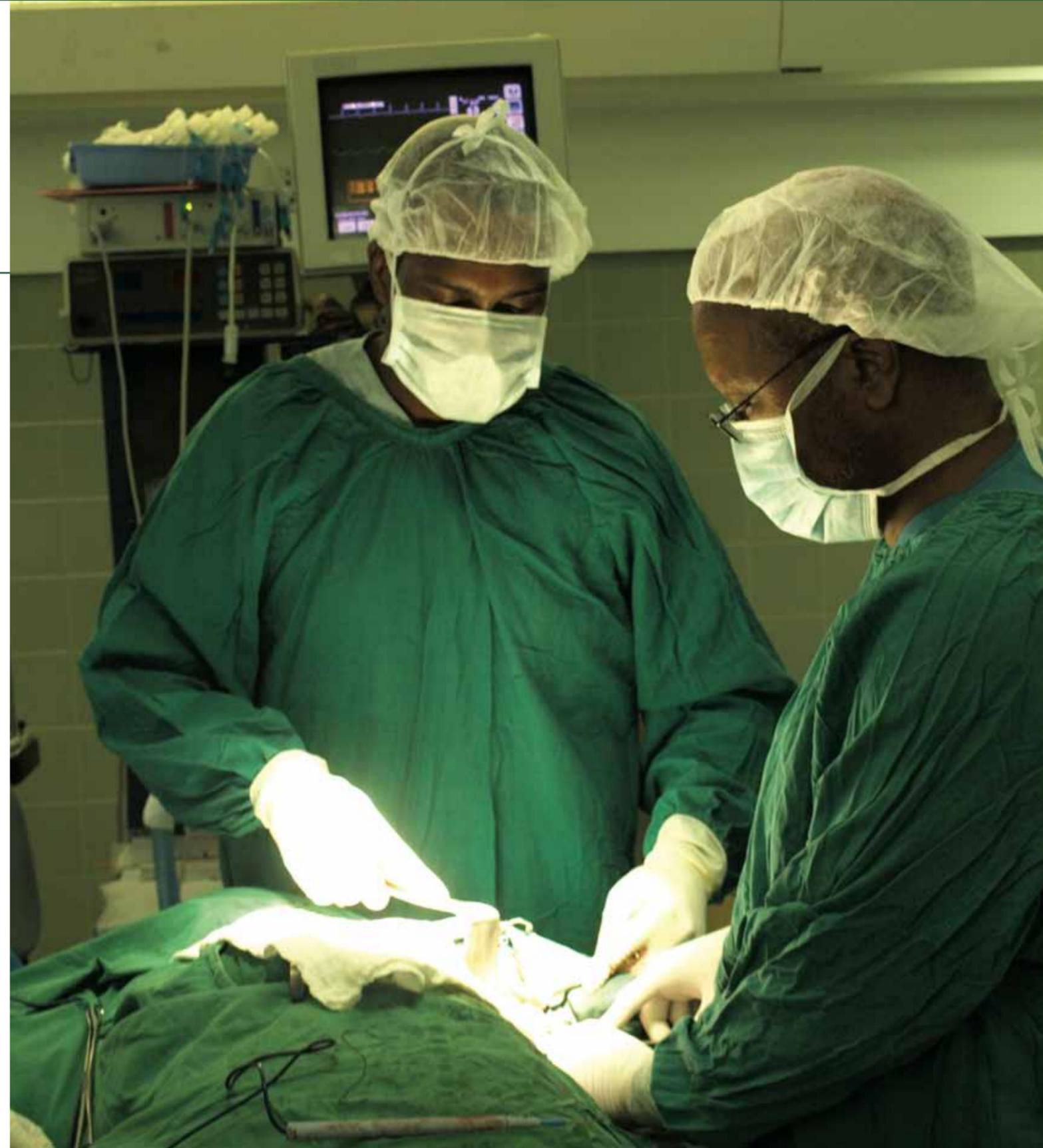


WHAT IS THE SENTINEL NODE?

Lymph is one of the body fluids which tends to accumulate in all organs and is drained back to the blood stream via a system of vessels called lymphatics. This system of lymphatic vessels is one of the favourite routes for cancer to spread from one organ to other parts of the body. Anatomists have long known that lymph from the entire breast drains to one or two lymph nodes at the lowest part of the axilla before being distributed to the many other lymph nodes. These one or two nodes through which all the lymph from the breast must pass are called sentinel nodes (the word sentinel literally means guard or gatekeeper).

RATIONALE FOR SENTINEL LYMPH NODE BIOPSY (SLNB).

Since breast cancer cells have to pass through the sentinel node to get to the other lymph nodes in the axilla, it follows that if the sentinel node is not involved by cancer, the other nodes will also be free of cancer and vice versa.



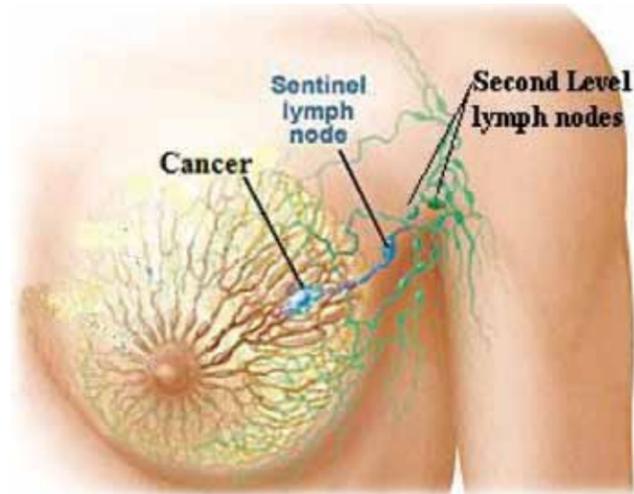
Therefore, what is required is a method to enable identification of the sentinel node in breast cancer patients. If the sentinel nodes can be identified easily, they can be removed and sent off to the pathologist who can quickly determine whether or not they are involved by cancer. If the sentinel nodes are not involved, the surgeon need not remove any more lymph nodes. If the sentinel nodes are involved, then the surgeon proceeds with the complete axillary lymph node dissection.

METHODS OF IDENTIFYING THE SENTINEL NODE

A lymphatic labelling agent is injected into the space beneath the nipple or the tissue surrounding the cancer. This agent is rapidly taken up into the lymphatic vessels and transported to the sentinel node where it is trapped. In North America, Europe and Japan the labelling agents of choice are a radioactive colloid and a blue dye named Isosulfan Blue. The former is identified in the sentinel node using a gamma camera (a device used to detect radioactivity) and the latter by the blue colour that it imparts to the sentinel node. Both labelling agents are extremely expensive and are not cost-effective in most developing countries. Methylene blue dye is a third labelling agent which has proven to be as accurate a sentinel node labelling agent as the previous two and which is much cheaper than either. For some reason which is unclear, methylene blue has not been popular in developed countries but it represents the only methodology by which surgeons in developing countries are going to be able to offer the important technique of sentinel node biopsy to all their patients with breast cancer who are candidates for the procedure.

HOW DO WE KNOW WHEN A SURGEON IS PROFICIENT AT SLNB?

The other problem with transferring the technology of SLNB to developing countries was that surgeons need to do a certain number of these procedures (the learning curve) before they can be considered competent to offer it to breast cancer patients. Most patients do not benefit from SLNB during the "learning curve" phase of a surgeon. The most authoritative guidance with respect to the length of the learning curve used to emanate from the American Society of Breast Surgeons. This body suggested that the learning curve was probably 20 cases but admitted that this recommendation was based on expert opinion and that it appeared to be much shorter for some surgeons. What was necessary was an objective method of assessing the learning curve of individual surgeons so that those who learn faster than others would be able to offer SLNB to their patients in the shortest possible time.



WHAT THE UWI, MONA-WJC RESEARCH TEAM SET OUT TO DO

The goals of the research project were twofold and both were achieved. First, Dr. East and team were able to corroborate evidence that methylene blue dye is an accurate label for the sentinel node. Second, they applied a statistical method called the tabular CUSUM in the learning curve analysis of the two surgeons (Drs. East and Valentine), using identification of the SLN as the criterion of success. The tabular CUSUM is a hypothesis test which is effectively repeated for each event and which takes account of cumulative past performance. This methodology had never been previously used to prospectively analyse the learning curve for SLNB. The researchers were able to prove that the learning curve could be as short as 8 consecutive, successfully identified cases and by a method that is easily applied by surgeons without any special statistical knowledge.

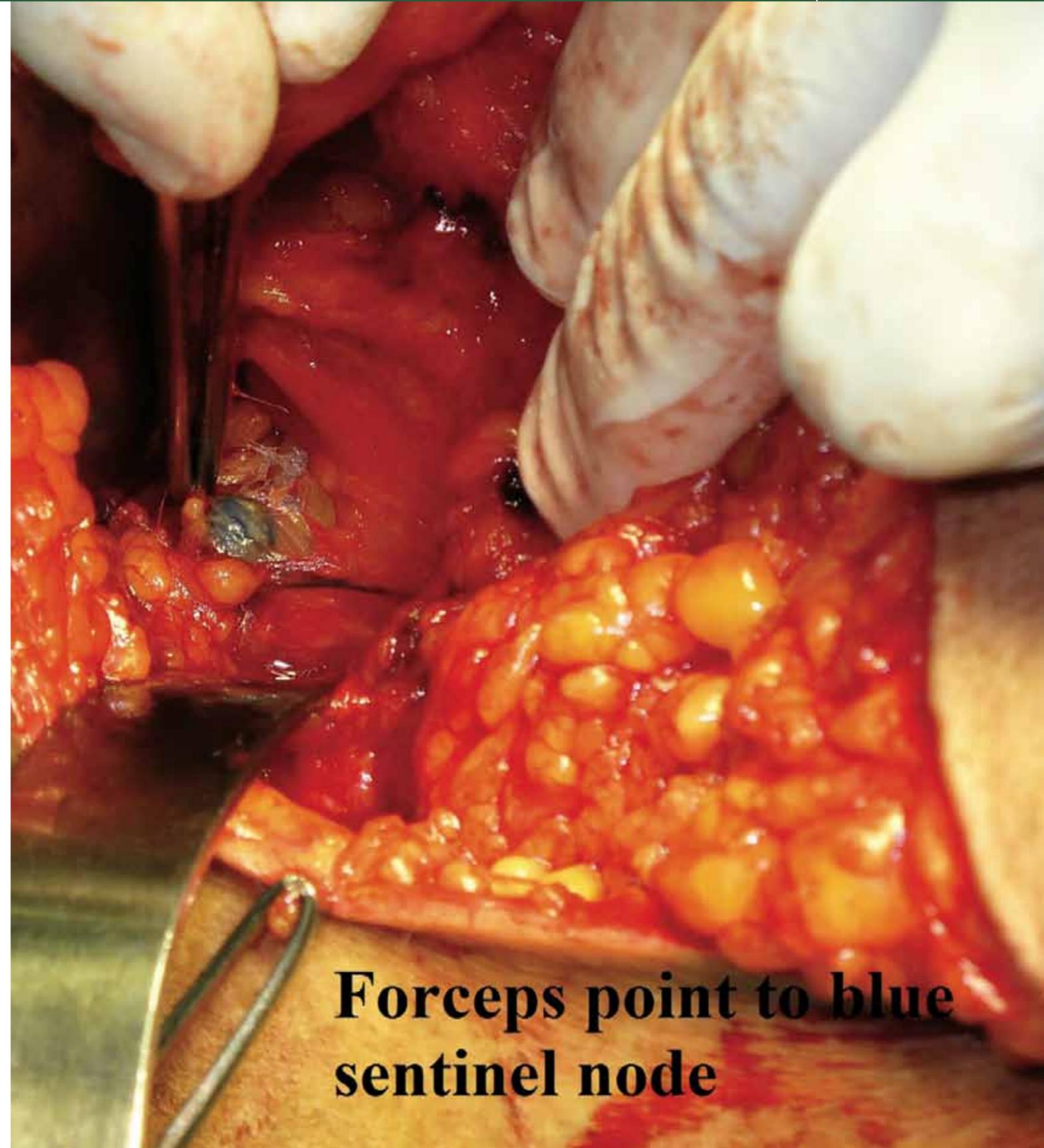
IMPLICATIONS OF THE RESEARCH

Breast surgeons, particularly those in developing countries, now have a roadmap for introducing SLNB programs, using methylene blue dye, for the benefit of their breast cancer patients.

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Forceps point to blue sentinel node

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Department of Basic Medical Sciences

Professor Helen Asemota

Department of Basic Medical Sciences

Yam Glorious Yam

YAM EATEN EVERYWHERE

The yam (*Dioscorea sp.*) is an edible root crop that is mainly grown in the tropics. The tuber forms a major component in the diet of millions of the world's population in Africa, Southeast Asia, the Pacific and the Caribbean as a source of digestible carbohydrate. There are over 24 cultivars of yams grown in Jamaica, belonging to five species, namely: *white yams*, *soft yam*, *yellow yam*, *yampie*, and *Chinese yam*. There are also the non-edible yams which are referred to as "wild yams." They are usually found in the wild and grow mainly in the limestone regions of the island.

The main use of yam is as food, usually eaten boiled or roasted. The nutrient content of the tuber is 50-85 % starch, 3-8% protein, 2-5% fiber, 2-7 % ash, and 0.2-0.7% fat of the dry tuber. Starch is the major carbohydrate reserve in yam tubers. It occurs as a tasteless, odorless, fine white powder in its dried extracted form. Despite its high carbohydrate content, mainly in the form of starch, yam is not listed among the most common sources of industrial starch which is primarily obtained from corn, potato, wheat, tapioca and rice. This is primarily due to the lack of adequate information on the properties, suitability and functionality in its products.

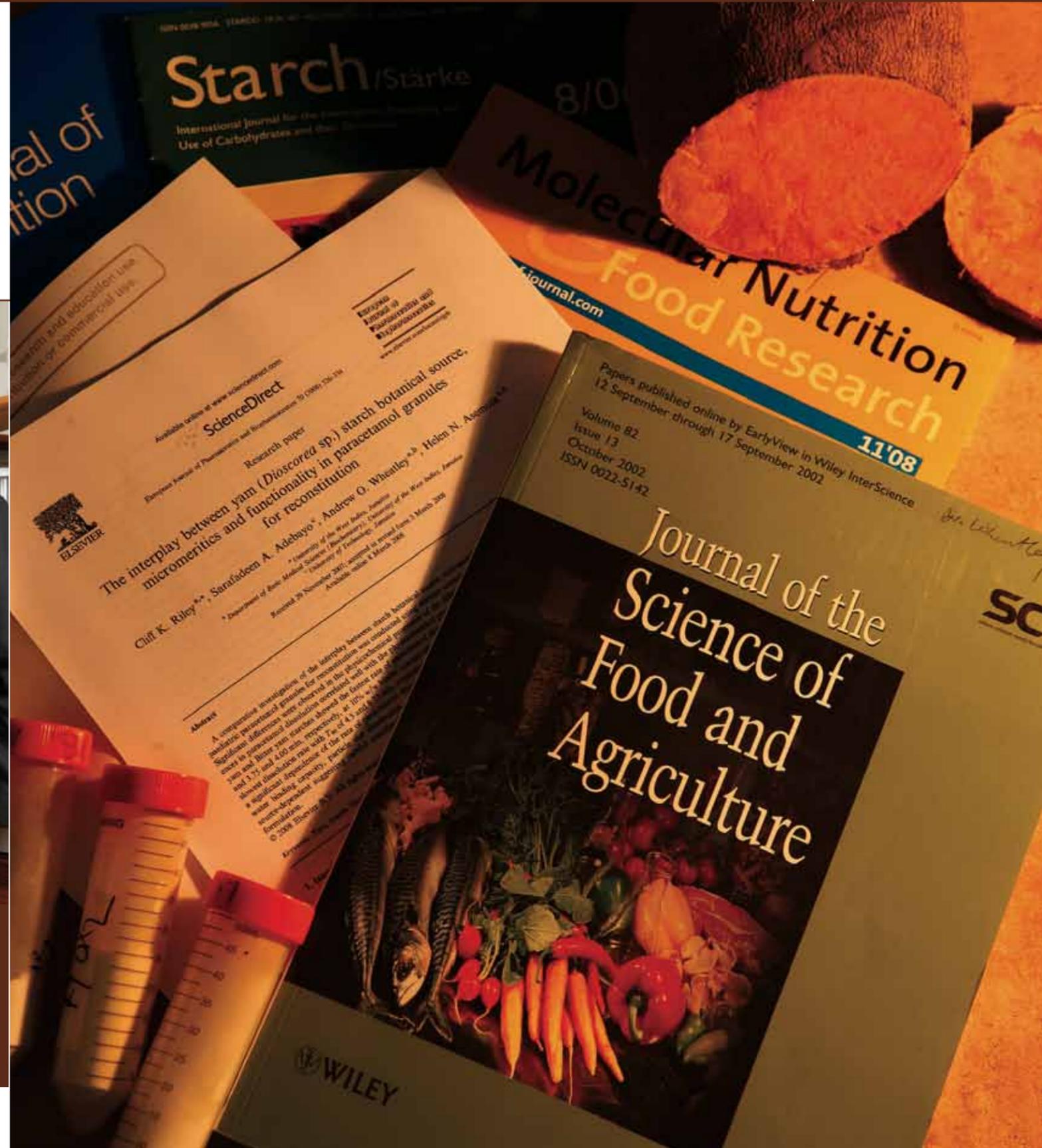
NEED FOR INDUSTRIAL EXPLOITATION OF YAMS

Over 100,000 tonnes of yams are produced annually in Jamaica (down from 200,000 tonnes in 2000). However only about 5% is exported with losses of up to 40% of the total production reported. These losses amount to over US\$20 million annually. This has significantly affected revenue generation in the agricultural sector, primarily farmers, exporters and processors. These losses are primarily due to the poor storageability of the yam



Riley | Wheatley

Despite its high carbohydrate content, mainly in the form of starch, yam is not listed among the most common sources of industrial starch.



tubers. However, the quantities and revenue lost during storage can be prevented if immediately after harvest their starches are extracted and used as ingredients in tablets, capsules, granules and other products. This could reduce the amount of yam that would normally be discarded or lost during storage, increase revenue generation and reduce the country's demand for imported starches for use in pharmaceutical products.

With this in mind the UWI researchers embarked on investigating the physicochemical properties of yam starches and their effectiveness as binders in paracetamol granules, tablets and capsules in a bid to stimulate industrial applications by local manufacturers, primarily in those in the pharmaceutical industry.

STARCH PROPERTIES AND IMPACT ON PHARMACEUTICAL PRODUCTS

Properties such as granule size, shape, specific surface area, sensitivity to moisture, density, swelling power, purity, reactivity, porosity among others play an important role in the use and functionality of starches in finished pharmaceutical products. If the properties of starch from different plant sources are strikingly different, they may impact significantly on processing and product quality and may be a potential source of differences in brand/generic product performance or even in batch-to-batch and lot-to-lot variation in the same product formulated with different starches. In addition, these differences in material properties may impact on the quality of starch products and their performance in dosage forms (pharmaceutical products).

Paracetamol, one of the most popular analgesic (pain relief) and antipyretic (body temperature reduction) drug, is of poor aqueous solubility (1 in 70 parts of water, BP). Hence, its paediatric solution formulations invariably incorporate alcohol based co-solvents. Apart from the limited stability of aqueous drug products, recent demand by the paediatricians for alcohol-free paracetamol formulation has necessitated consideration of alternative dosage formulation.

Presently, no commercial paracetamol granule for reconstitution appears to be on the market, especially in the tropics where extremes of climatic conditions could compromise shelf-stability of liquid preparations.

PERFORMANCE IN PARACETAMOL SOLID DOSAGES (TABLETS AND GRANULES)

Starches from five local cultivars namely; Round leaf yellow yam (RY), Sweet yam (SY), Negro yam (NY), Chinese yam (CY) and Bitter yam (BY) were extracted, purified and their physical and chemical properties evaluated. The



starches were then incorporated as binders in paediatric granules for reconstitution using paracetamol as the active pharmaceutical ingredient (paracetamol [2.5 % w/w], starch [2.5 and 10 % w/w] and sucrose [20 % w/w]) and rate of paracetamol release determined in vitro (outside a host). British Pharmacopoeia corn starch (CS) was used as the control binder.

The physicochemical properties of the yam starches were found to be dependent on the botanic (plant species) source with identifiable differences observed among the cultivars studied. Apart from the potential effects of these properties on processability, consistency of content and physical characteristics of pharmaceutical products, reasonable correlations were established between these properties and the rate of paracetamol release. Properties such as starch granule size, surface tension, specific surface area and viscosity are positively correlated with the rate of paracetamol release.

The dissolution of paracetamol from granules formulated with different yam starches is significantly affected by the properties of the starches and the concentration used as binder. Granules formulated with starch from CY and BY have faster rate of paracetamol dissolution when used as binders compared to those formulated with RY, NY, SY and official corn starch.

Paracetamol granules formulated with Chinese yam and Bitter yam starches had dissolution times of 2.2 minutes and 2.6 minutes respectively at a starch concentration of 2.5 % compared to that with corn starch (4.55 minutes). This indicates that tablets and granules formulated with Chinese yam and Bitter yam starches could release the active ingredient twice as fast as those containing official corn starch leading to faster relief from the condition being treated for.

Hence, careful consideration of starch botanic source in starch binder selection is essential in order to obtain the required drug dissolution rate while preserving other desirable physical properties of the granules.



INDUSTRIAL SIGNIFICANCE

The work presented will have far reaching impact on stakeholders in the agricultural sector, the pharmaceutical industry and consumers of pharmaceuticals.

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Dr. Donovan McGrowder

Department of Pathology

Predicting Postoperative Bleeding

Cardiac surgery remains associated with a significant risk of postoperative bleeding. This risk is accompanied by increased morbidity and mortality, as is any associated transfusion. Bleeding has been reduced in recent years because of advances in surgical technique and improvements in the management of the coagulopathy associated with cardiopulmonary bypass. Thromboelastometry is a whole blood assay performed to evaluate the viscoelastic properties during blood clot formation and lysis. Point-of-care testing, including thromboelastometry, has been used to support a more rational approach to the management of significant postoperative bleeding. This has resulted in a reduction in the use of clotting products after cardiopulmonary bypass. In an article published in *Journal of Cardiothoracic and Vascular Anesthesia*, Dr. McGrowder and colleagues in the Departments of Haematology, Research and Development, and Anaesthetics at Royal Brompton Hospital, London, United Kingdom carried out a prospective observational study with fifty-eight adult male and female patients undergoing primary coronary artery revascularization.

RESULTS OF THE STUDY

The key finding of the study is that while postoperative ROTEM thromboelastometry had a reasonable positive predictive value, its negative predictive value was 100% for the prediction of bleeding in the early postoperative period. This has led to the routine use of ROTEM thromboelastometry at the Royal Brompton Hospital. Other studies have reported that a major benefit of ROTEM thromboelastometry is the quick detection of a developing coagulopathy already during



In Jamaica, the prevalence of iron deficiency anaemia in children is estimated at about 30%.





Iron deficiency is a common clinical problem. The correct diagnosis of iron deficiency is essential for successful patient management because it may be the presenting sign of a serious illness such as a gastrointestinal malignancy.



cardiopulmonary bypass. It is hoped that this method which is used in many hospital in the United States and Europe will be implemented in hospitals in the Caribbean in the near future.

IRON DEFICIENCY- A COMMON CLINICAL PROBLEM

Iron deficiency is a common clinical problem. The correct diagnosis of iron deficiency is essential for successful patient management because it may be the presenting sign of a serious illness such as a gastrointestinal malignancy. In many cases, iron deficiency is relatively simple to diagnose and treat. However, in some patients with medical problems such as infection, inflammation and malignancy, the diagnosis can be difficult. Measurement of serum ferritin is currently the accepted laboratory test for diagnosing iron deficiency. Other commonly used laboratory tests such as serum iron, total iron binding capacity, mean corpuscular volume, and transferrin saturation provide little additional diagnostic value. In an article published in *Clinica Chimica Acta*, Dr. McGrowder and colleagues at the University of the West Indies and Department of Clinical Biochemistry, Royal Brompton Hospital, London, United Kingdom investigated the clinical utility of soluble transferrin receptor in the assessment of iron status in adult patients with cystic fibrosis.

IMPORTANT FINDINGS AND FURTHER STUDY

The authors found that iron status of patients with cystic fibrosis can be accurately assessed by soluble transferrin receptor which is unaffected by the acute phase response. The prevalence of iron deficiency anaemia in the Caribbean differ from place to place, and observed rates ranging from 27 to 75% in pregnant women, 19 to 55% in lactating women and 15 to 80% in young children have been reported. In Jamaica, the prevalence of iron deficiency anaemia in children is estimated at about 30%. Further studies will be done to identify patients with iron deficiency anaemia in these different groups using soluble transferrin receptor.

OTHER PUBLICATIONS

Other articles by Dr. McGrowder during the academic year were published in: *Archives of Medical Sciences*, *Journal of Medical Biochemistry*, *Journal of Rural and Remote Health*, *Journal of the Royal Society for the Promotion of Health*, and *Open and Geriatric Medicine Journal*.

Donovan McGrowder is senior lecturer in the Department of Pathology and a Consultant Chemical Pathologist at the University Hospital of the West Indies. donovan.mcgrowder@uwimona.edu.jm

Fourteen Publications

Professor Terrence Forrester

Tropical Medicine Research Institute

DIRECTOR OF THE TMRI

Professor Terrence Forrester is the Director of the Tropical Medicine Research Institute (TMRI) at the UWI, Mona. During the period August 1, 2008 to July 31, 2009 he published fourteen research manuscripts; thirteen of which appeared in internationally recognized journals while the remaining one was published in the University's West Indian Medical Journal. He also attracted research funds amounting to approximately US\$467,000.

RESEARCH INTERESTS

Professor Forrester's principal research priority was the elucidation of the mechanisms which underlie the increased risk of obesity and cardio metabolic disease in populations from poor societies with a history of chronic under nutrition. He and his research team have explored, in depth, body composition, fuel partitioning related to body composition, appetite control of macronutrient selection and the influence on energy intake, insulin sensitivity, and cardiac and conduit artery structure and function, all phenotypic components of the obesity and cardiometabolic risk that characterize such undernourished populations.

WORKING WITH OVERSEAS PARTNERS

In collaboration with partners in UK and New Zealand, the research team simultaneously looked at some of the cellular and epigenetic underpinnings of the phenotypic differences between well-nourished populations and malnourished ones. The findings are relevant for making public policy to better guide how undernourished populations might transition into technological lifestyles while minimizing the burden of obesity and chronic disease.

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Professor Forrester's principal research priority was the elucidation of the mechanisms which underlie the increased risk of obesity and cardio metabolic disease in populations from poor societies with a history of chronic under nutrition.



Professor Brendan Bain

Department of Community Health and Psychiatry

Will Leadership Training Produce More Effective Leaders in the Caribbean Health Sector?

THE LEADERSHIP CHALLENGE

Up to recently in the Caribbean, middle and senior managers in the health sector have often been promoted to their positions just on the basis of seniority. Few have had formal preparation for their leadership roles. In addition, very few have received on-the-job reinforcement of the principles and practice of leadership. For more than ten years, CARICOM Chief Medical Officers, officials at the Pan-American Health Organisation (PAHO) and University of the West Indies (UWI) staff have shared their concerns about these gaps, which hinder effective work. PAHO has taken steps to remedy the problem by offering opportunities for leadership training to a small number of Public Health practitioners from Caribbean countries. In addition, a doctorate in Public Health (DrPH) degree programme has been started recently at UWI. However, according to some observers, the need for leadership training exists across the entire health sector, not just in Public Health.

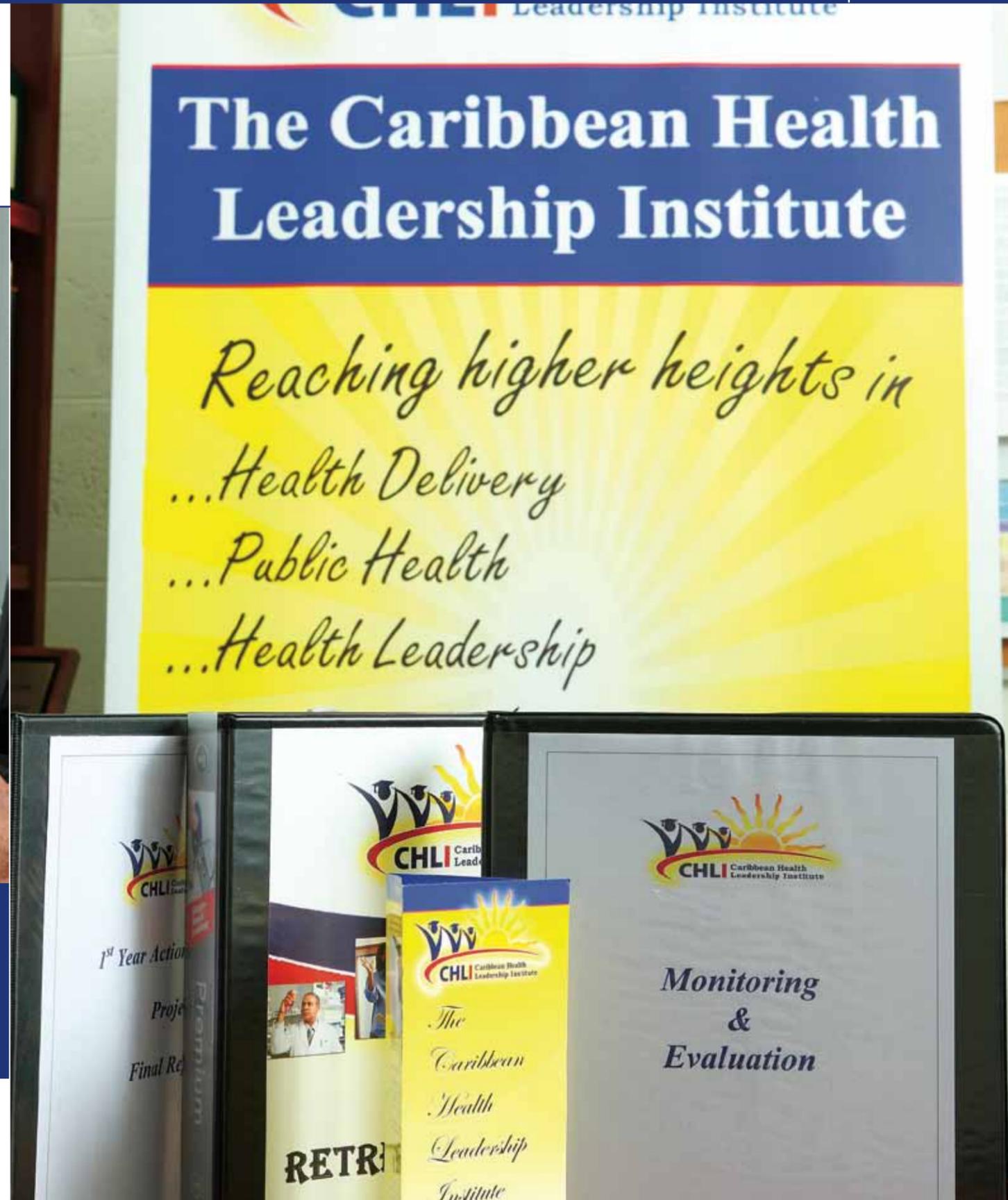
BIRTH OF THE CARIBBEAN HEALTH LEADERSHIP INSTITUTE (CHLI)

In 2007, UWI's HIV/AIDS Response Programme (UWI HARP) grasped the opportunity to join in addressing the leadership gap. Support for the move came through the Global AIDS Program of the Centers for Disease Control and Prevention (CDC) with start-up funds from the US President's Emergency Fund for AIDS Relief (PEPFAR).

Staff at the Caribbean Regional Office of the CDC Global AIDS Program identified the need for managers of HIV programmes in the region to be exposed to leadership training. They made representation to their Head Office



Staff at the Caribbean Regional Office of the CDC Global AIDS Program identified the need for managers of HIV programmes in the region to be exposed to leadership training



in the USA. CDC Headquarters then prepared and released a request for proposals, inviting "an academic institution" to develop and deliver a suitable training programme. UWI HARP applied on behalf of UWI. And, in September 2007, the news broke that we had received a US\$2.1 million, five-year grant to establish the Caribbean Health Leadership Institute (CHLI). This is the first agreement of this kind between CDC and a Caribbean university. The Institute was launched in April 2008.

LEADERSHIP OF CHLI

CHLI team leader, Professor Brendan Bain is a former Head of the Department of Community Health & Psychiatry at Mona. His interest in health leadership was stimulated in 2005 when he attended a summer course in "Strategic Leadership and Management for Population and Reproductive Health" organized by the Bill and Melinda Gates Institute for Population and Reproductive Health, Johns Hopkins Bloomberg School of Public Health in Maryland, U.S.A.

According to Professor Bain, the definition of 'Health' used by CHLI encompasses the physical, mental, social and spiritual wellbeing of individuals and entire communities. Leadership is regarded as a combination of knowledge, wisdom, skills, attitudes and actions that must be mastered progressively throughout personal and professional life.

OPERATION OF CHLI

CHLI was started in the Faculty of Medical Sciences on the Mona Campus and has now been transferred to operate under the Office of the Vice-chancellor. Courses have been developed and are being run in partnership with staff of the US National Public Health Leadership Institute at the North Carolina Institute for Public Health (NCIPH), University of North Carolina, Chapel Hill.

To date, 49 scholars from 14 Caribbean countries have been admitted to CHLI in two groups. Participating countries range from Belize and the Bahamas in the west and north to Guyana and Suriname in the south. The programme brings together public health specialists, health administrators, doctors, nurses, pharmacists and laboratory staff, with preference given to persons with direct or indirect responsibility for HIV/AIDS programmes. The future aim is to open the opportunity to the entire health sector.

THE CHLI APPROACH

Retreats

Two three-day residential retreats, one early and the other later in the course, are a central feature of the CHLI programme. These occasions allow networking



The programme brings together public health specialists, health administrators, doctors, nurses, pharmacists and laboratory staff, with preference given to persons with direct or indirect responsibility for HIV/AIDS programmes.

between scholars, faculty and mentors, time for new learning, personal reflection and collaboration in small groups. Guest speakers share their accumulated experience in leadership with the participants.

Distance Learning

Other important facets of the course include: reading of recommended books and articles, listening to taped interviews with outstanding health leaders, optional writing of personal journals, on-going communication with faculty and mentors at a distance, an action learning project done in small groups with group members working from their respective countries, and monthly Internet-based seminars.

A lifelong leadership network

At the end of each year a new group of scholars graduates as members of the CHLI alumni. The long-term aim is to create a "lifelong learning network" across the Caribbean, with leaders who commit to passing on knowledge, skills and wholesome attitudes to each succeeding generation of leaders in health.

THE RESEARCH COMPONENT OF CHLI

Evaluation research is built into the CHLI programme. The hypothesis is that the programme will ultimately have a measurable impact on Caribbean HIV systems as well as on national and regional health systems in general. Early feedback from the participants indicates that they have welcomed this innovative approach to learning about leadership.



themselves and a clearer approach to relationships at the workplace. Some have said that others are noting the positive change in their behaviour. Some participants report that they have started to use some of the materials at their workplaces and others have already implemented organizational changes.

As the graduates continue to lead and manage health promotion, prevention, curative and social services, they will be interviewed at intervals by researchers to find out if CHLI is helping them to do better jobs individually and in teams. Their supervisors, peers and subordinates will also be interviewed for supporting evidence of personal and organizational change.

WHO WILL BENEFIT ULTIMATELY FROM CHLI?

The results of the CHLI programme will be shared with Ministries of Health, other persons and agencies involved in similar teaching/learning programmes and financial partners. In the final analysis, the goal



of CHLI is to improve health systems to the benefit of the general public.

Brendan Bain feels honoured and blessed to be the first UWI graduate trained in Clinical Infectious Diseases to work at the Mona Campus of the University of the West Indies. He enjoys participating in interdisciplinary research and is a founding member of the Trans-Caribbean HIV/AIDS Research Initiative. He is the principal investigator of a grant from the Centers for Disease Control and Prevention for the establishment of the Caribbean Health Leadership Institute. brendan.bain@uwimona.edu.jm

Tropical Medicine Research Institute

Professor Terrence Forrester
Mr. Claremont Kirton
Dr. Georgiana Gordon-Strachan
Dr. Colette Cunningham-Myrie
Ms. Georgia McLeod
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Ms. Kristin Fox

Impact of Jamaica National Building Society's Micro-Credit Programme on Health and Development in Jamaica

UWI PARTNERS WITH JN SMALL BUSINESS LOANS LTD.

There have been reports of the benefits of micro-credit financing in several countries of the world. It is thought to be an effective strategy for social and financial transformation of the poor. In Jamaica, one of the major stakeholders in the micro-credit financing business is Jamaica National Small Business Loans Limited. A partnership between the Tropical Medicine Research Institute and Jamaica National was forged to determine the impact of micro-credit financing on the health and development of their loan beneficiaries. The loan beneficiaries (cases) were compared with a control group of households who had not received micro-credit loans. The individuals from the control group lived in the same communities as the beneficiaries and were of the same age group and sex. Both the beneficiaries and the controls had children who were between the ages of 6-16 years old.

This case-control study design was a key strategy in establishing an appropriate comparison group which facilitated our analyses. We were able to determine whether the micro-credit loan was making an impact on the household from the economic, educational and health perspectives.



Dr. Gordon-Strachan, Kirton, Cunningham-Myrie, McLeod, Forrester

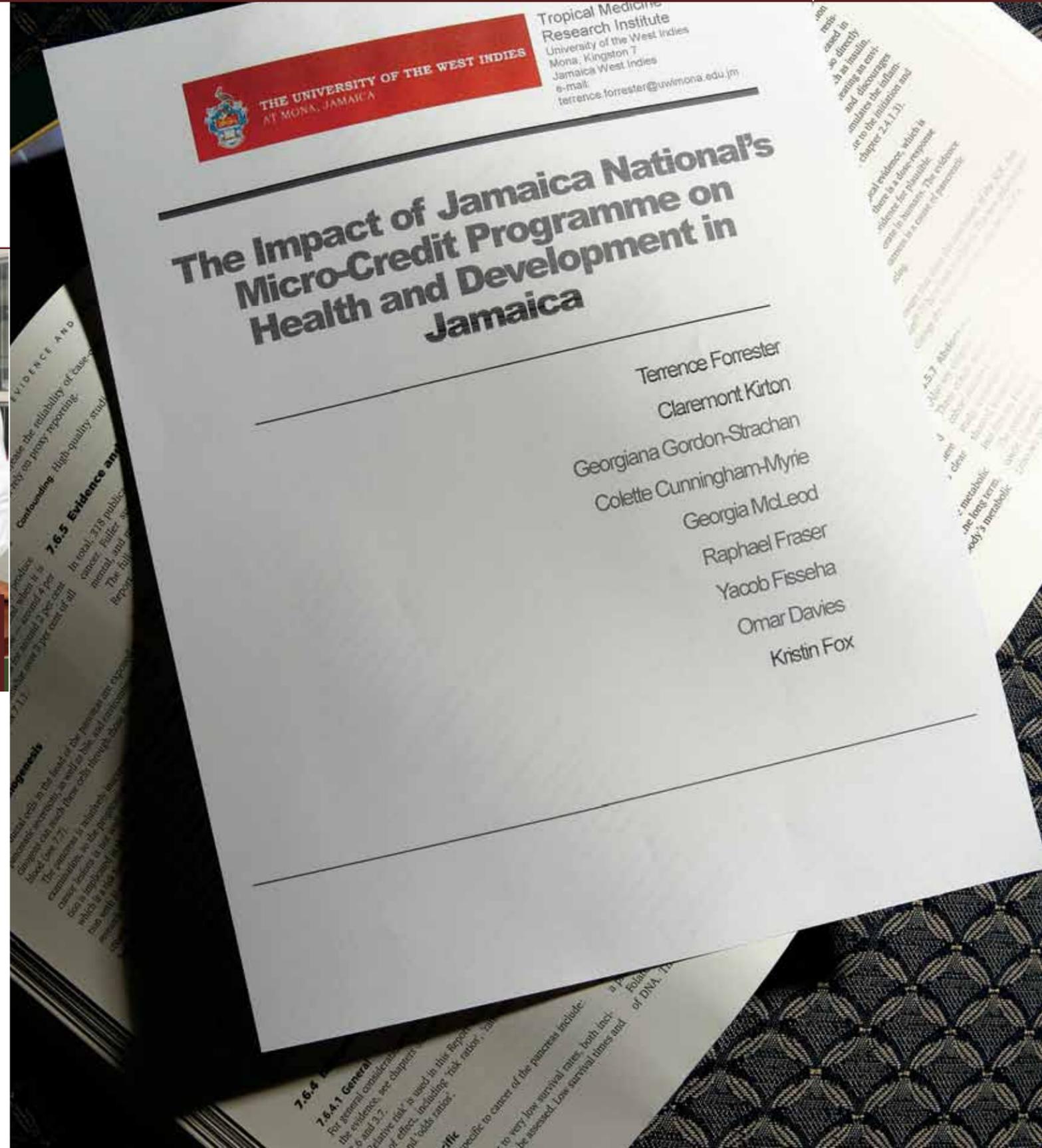
The comparisons uncovered some interesting facts about the two groups: the ones who received loans and the ones who did not.

ECONOMIC IMPACT

The households which received loans were, without doubt, better off economically than those who did not. The loan beneficiaries had spent more money. Some of the areas on which the money was spent were: food and non-consumption goods/services. The beneficiaries were more likely to own their own home and had more durable goods, for example more of them owned computers, motor bikes and cars.

HEALTH IMPACT

The downside of economic transition from poverty to wealth is that it is associated with an increased risk of cardiovascular diseases. In this study, the loan beneficiaries had worse cardiovascular risk status than controls.





The researchers proved that the loan beneficiaries are better off financially and appeared to have the potential to offer their children more education.

MORE MONEY – A GOOD THING OR A BAD THING?

The researchers proved that the loan beneficiaries are better off financially and appeared to have the potential to offer their children more education. This has implications for sustainable improvements in their standard of living; however, it is evident that there are some negative consequences especially in the area of health. The data suggest that there is an increase in food consumption levels without attention being paid to nutrient intake. Hence their health needs to be addressed.

Terrence Forrester is the director, TMRU and the Tropical Medicine Research Institute, University of the West Indies, Mona. He is a physiologist who has earned an international reputation in the area of hypertension research. terrence.forrester@uwimona.edu.jm

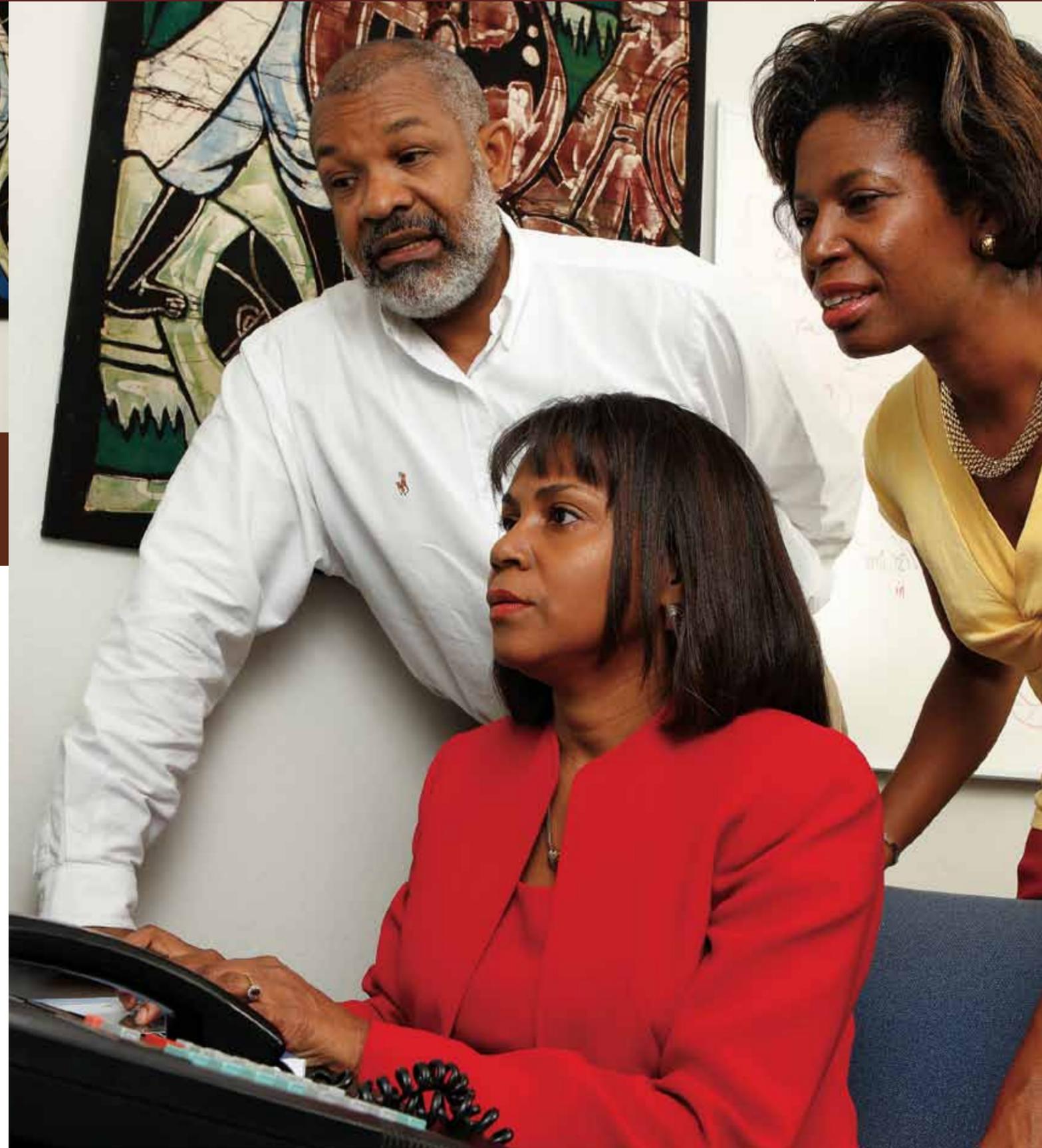
Claremont Kirton is senior lecturer and head, Department of Economics, University of the West Indies, Mona. He teaches development economics and finance. His most recent research work includes studies on micro-enterprise behaviour in the Caribbean and migration and remittances. claremont.kirton@uwimona.edu.jm

Georgiana Gordon-Strachan received her Ph.D. in Biochemistry from the University of the West Indies and her M.Sc. in Health Policy, Planning and Financing from the London School of Economics and Political Science. She is a lecturer in epidemiology in the Health Research Resource Unit of the Faculty of Medical Sciences, University of the West Indies. georgiana.gordonstrachan@uwimona.edu.jm

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Other Researchers

- Raphael Fraser-UWI
- Yacob Fisseha
- Omar Davies
- Kristin Fox-UWI



Faculty of
Pure & Applied
Sciences



Professor Willem Mulder

Department of Chemistry

Development of New Modified Electrodes

A group of scientists in Spain, Argentina and at the UWI decided to look at the properties of metals that are used as electrodes in scientific experiments. Some of these experiments include monitoring of composition of chemicals in solution and monitoring the change in composition of a solution. These solutions could be blood, water or other liquids.

The range of these applications can be greatly extended by coating these electrodes with a very thin film consisting of chain-like organic molecules that involve compounds that respond to the composition of the fluid.

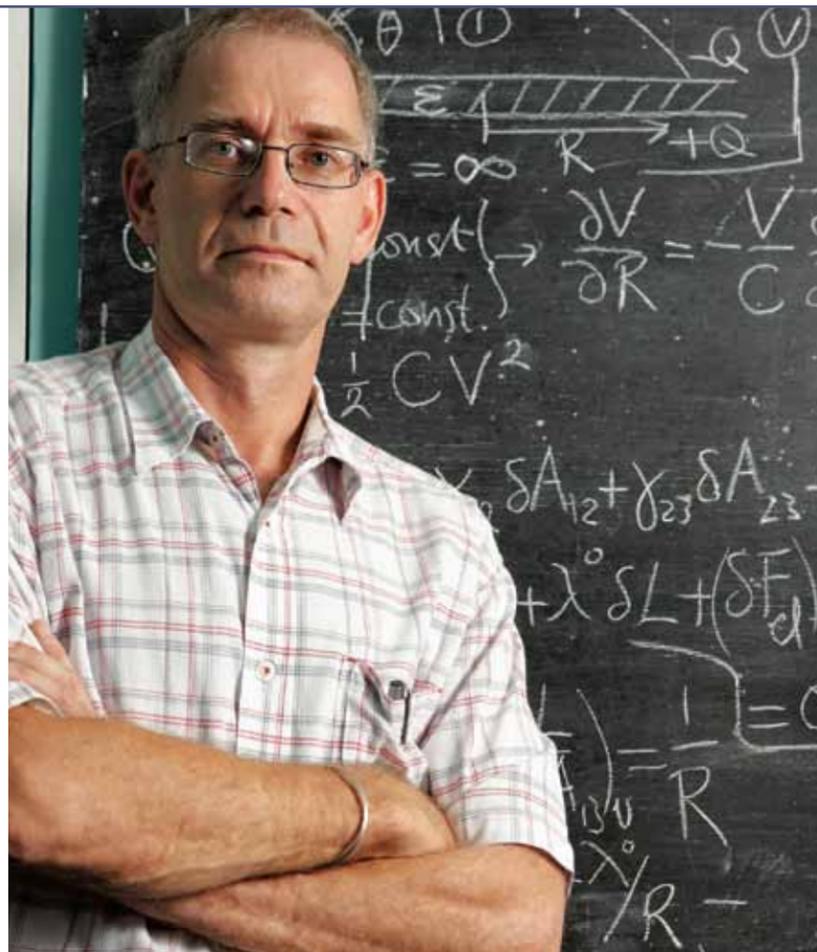
WHAT IS BIOMIMETICS?

The modified electrodes have also found wide application in biological studies as they can be used to mimic the transport of charged particles across biological cell membranes. This particular application goes by the name biomimetics.

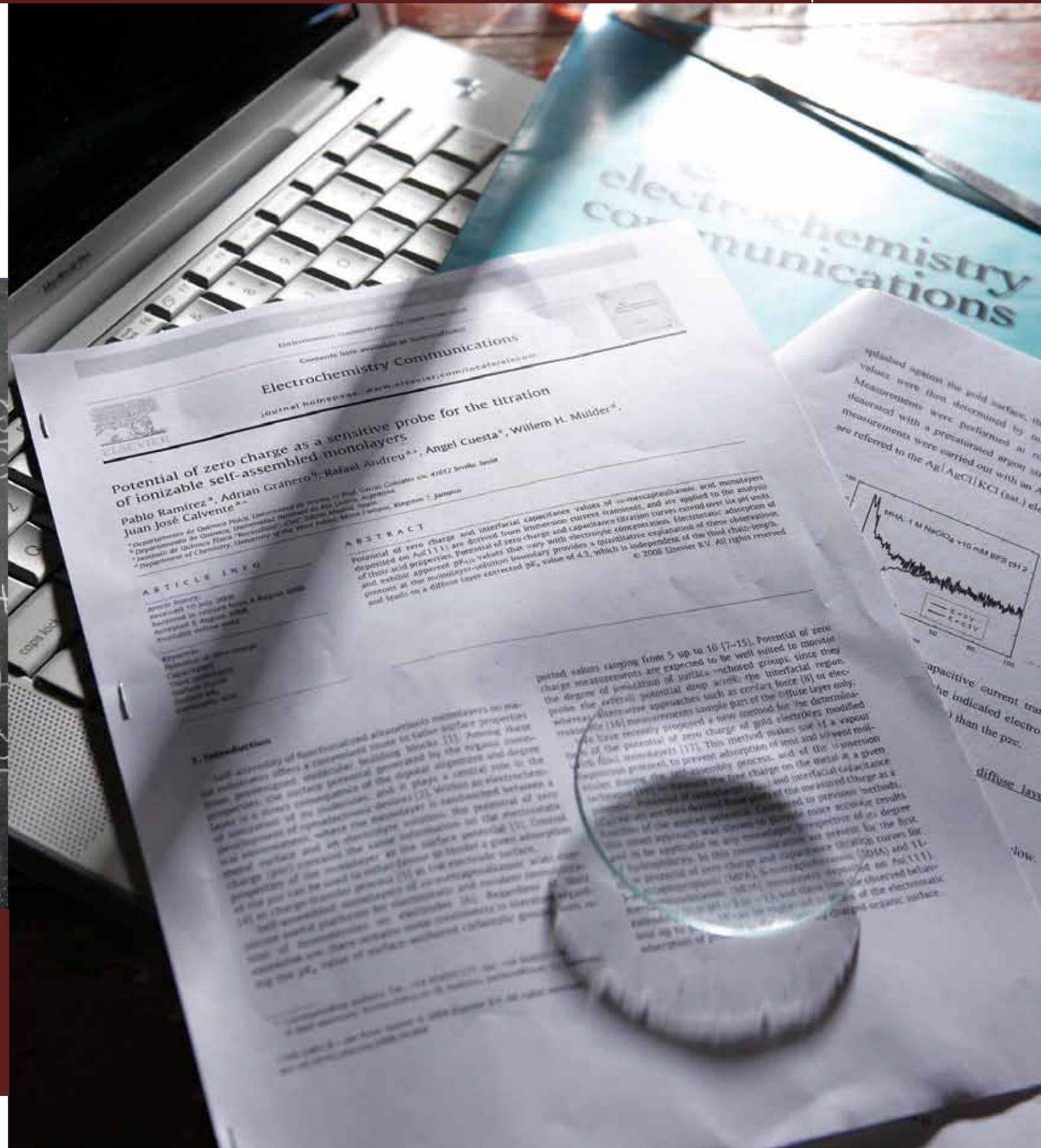
NEW METHODS OF MAKING THESE ELECTRODES

The researchers developed a novel method of forming densely packed organic films consisting of hydrocarbon chain molecules with a sulphur atom at one end of each molecule, through which the molecules can attach themselves to the electrode. At the other end is a group of atoms with variable composition which is in direct contact with an electrolyte solution.

It is the properties of this second group of atoms that determine the characteristics of the coated electrode. Organic thin films of this nature are commonly referred to as "self-assembled monolayers" (SAMs), and their thickness is equal to the length of one molecule, typically in the order of nanometers (1 nm = 0.000000001 meter). The method of forming these films is based on a process in which the organic molecules are deposited on to gold from a vapour phase which produces a layer at a density not previously attained.



The researchers developed a novel method of forming densely packed organic films consisting of hydrocarbon chain molecules with a sulphur atom at one end of each molecule, through which the molecules can attach themselves to the electrode.



Electrochemistry Communications
Journal homepage: www.elsevier.com/locate/elecom

Potential of zero charge as a sensitive probe for the titration of ionizable self-assembled monolayers
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ABSTRACT

Potential of zero charge and interfacial capacitance values of α -mercaptoalkanoic acid monolayers deposited on Au(111) are derived from immersion current titrations, and are applied to the analysis of their acid properties. Potential of zero charge and capacitance titration curves extend over six pH units and exhibit apparent pK_a values that vary with electrolyte concentration. Electrostatic adsorption of protons at the monolayer-solution boundary provides a quantitative explanation of these observations and leads to a diffuse layer corrected pK_a value of 4.3, which is independent of the thin chain length.

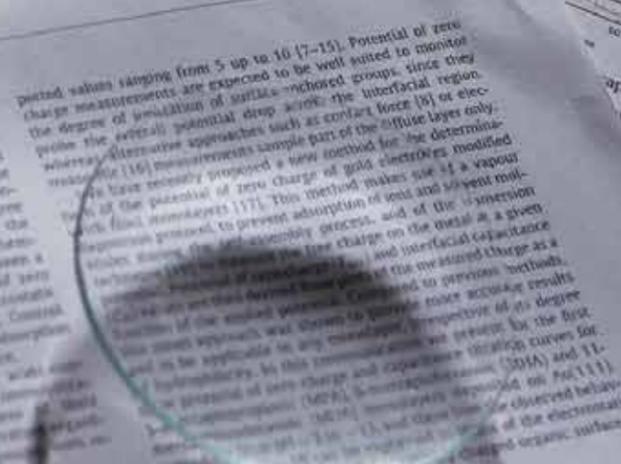
ARTICLE INFO

Article history:
Received 10 July 2009
Received in revised form 4 August 2009
Accepted 6 August 2009
Available online 10 August 2009

Keywords:
Potential of zero charge
Interfacial capacitance
Immersion current titration
Electrostatic adsorption
pH titration

1. Introduction

The potential of zero charge (PZC) of a metal electrode offers a convenient route to tailor surface properties upon presentation of molecular building blocks [1]. Among these properties, the surface potential generated by the regular orientation of its molecules, and it plays a central role in the development of electrochromic devices [2]. Within an electrochromic device, where the molecules are sandwiched between a metal surface and an electrochromic solution, the potential of zero charge (PZC) controls the surface potential [3]. Control of the PZC, value of surface-saturated cathodic groups [4] and the potential of zero charge [5] of the electrode surface, charge [6] can be used to tailor the surface potential [7]. The potential of zero charge (PZC) of a metal electrode offers a convenient route to tailor surface properties upon presentation of molecular building blocks [1]. Among these properties, the surface potential generated by the regular orientation of its molecules, and it plays a central role in the development of electrochromic devices [2]. Within an electrochromic device, where the molecules are sandwiched between a metal surface and an electrochromic solution, the potential of zero charge (PZC) controls the surface potential [3]. Control of the PZC, value of surface-saturated cathodic groups [4] and the potential of zero charge [5] of the electrode surface, charge [6] can be used to tailor the surface potential [7].



UWI'S CONTRIBUTION

A model system was investigated for testing certain theoretical predictions, based on a mathematical description that was developed at UWI, about the dependence of the voltage difference between the modified electrode and a standard reference electrode on environmental parameters such as temperature, salt concentration and the acidity or alkalinity (pH) of the solution. The surface film consisted of acetic acid, the main ingredient of vinegar, anchored to the surface via hydrocarbon chains.

In solution, a fraction of the acidic groups loses its protons, the positively charged building blocks of atomic nuclei, leaving behind a negative charge on the film. In addition, there is usually a net charge present on the metal itself due to an excess or deficit of electrons, the elementary negative charges. If the combined charge is negative, positively charged salt ions from solution will accumulate near the surface while the negatively charged ones will be repelled, thus creating a diffuse charge or "electrical double layer" in the solution next to the film which is the source of the measured voltage.

The interface between the electrode and the electrolyte solution, which typically contains salt and acids or alkalis, has the capacity to store electric charge. This capacity depends on voltage in a manner that depends on the composition of the film.

NEW METHODOLOGY

A simple technique was developed to determine the voltage at which no charge is present on the metal, the so-called "potential of zero charge". A jet of electrolyte solution was splashed against the electrode that was held at fixed potential, thus closing the cell circuit and allowing the detection of weak currents as the surface capacitor was charged. The voltage was then tuned until this charging current could no longer be detected.

In sufficiently alkaline solutions, when most protons are stripped from the acidic groups, the surface charge can reach values that would not be attainable at bare electrode surfaces without causing oxidation of the electrode or reduction of water. The resulting electric field in the solution close to the film may become extremely strong, to the point where the water molecules become fully aligned with that field. This phenomenon is known as "dielectric saturation".

HOW TO MAKE SENSE OF THE MEASUREMENTS

The mathematical model for these modified electrodes that was developed at UWI accounts for this dielectric saturation, an effect that is usually not considered important, but which was shown to contribute significantly to the measured voltage.

Analysis of our data in light of the model established the fact that the affinity of the acidic groups that are anchored to a metal surface does not depend on the hydrocarbon chain



A model system was investigated for testing certain theoretical predictions, based on a mathematical description that was developed at UW

length, and is not significantly different from that of acetic acid, something that until recently was still a matter of debate.

The fundamental understanding of surface structure and properties furnished by the theory will provide a useful conceptual and quantitative framework to tailor surface properties from pre-designed molecular building blocks, as well as a meaningful and reliable interpretation of electrochemical data (currents, voltages) obtained with modified electrodes.

THE UWI'S CONTRIBUTION ADDS VALUE

Thus, the electrochemical method has been established as reliable and useful for the study of surface phenomena, and provides important fundamental information, that can be used, for example, in the development of optoelectronic devices and in biosensor technology, e.g. the use of SAMs as platforms for the immobilization of biomolecules such as enzymes, or the detection of immune responses by so-called antigen-specific T-cells, which emit protons when activated, by converting chemical stimuli into electrical currents.

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Dr. Nagarani Ponakala

Department of Mathematics

Effect of boundary absorption on dispersion in Casson fluid flow in an annulus: application to catheterized artery

The theory of dispersion of a contaminant in fluid flows has wide application in chemical engineering, biomedical engineering, physiological fluid dynamics and environmental science. The basic principle underlying the dispersion theory is the spreading of a solute (any substance dissolved in a given solution) in a flowing fluid due to combined action of molecular diffusion and non-uniform velocity distribution.

APPLICATIONS OF DISPERSION

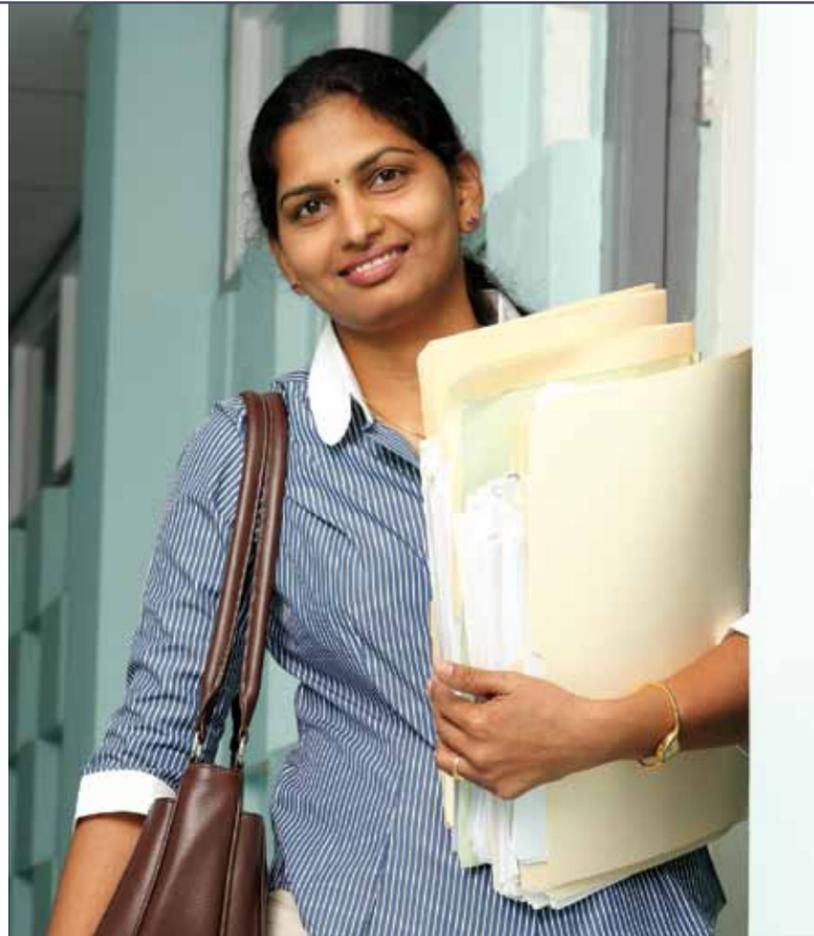
In chemical engineering, the dispersion of a gaseous tracer injected into a flowing stream of a second gas, is studied under conditions where the tracer gas can also be exchanged by diffusion within a stagnant gaseous zone held in a porous solid. The dispersion of salt and other materials in estuaries are studied through models of dispersion of a passive contaminant in a two dimensional open channel.

EXAMPLES OF DISPERSION MODELS IN BLOOD FLOW

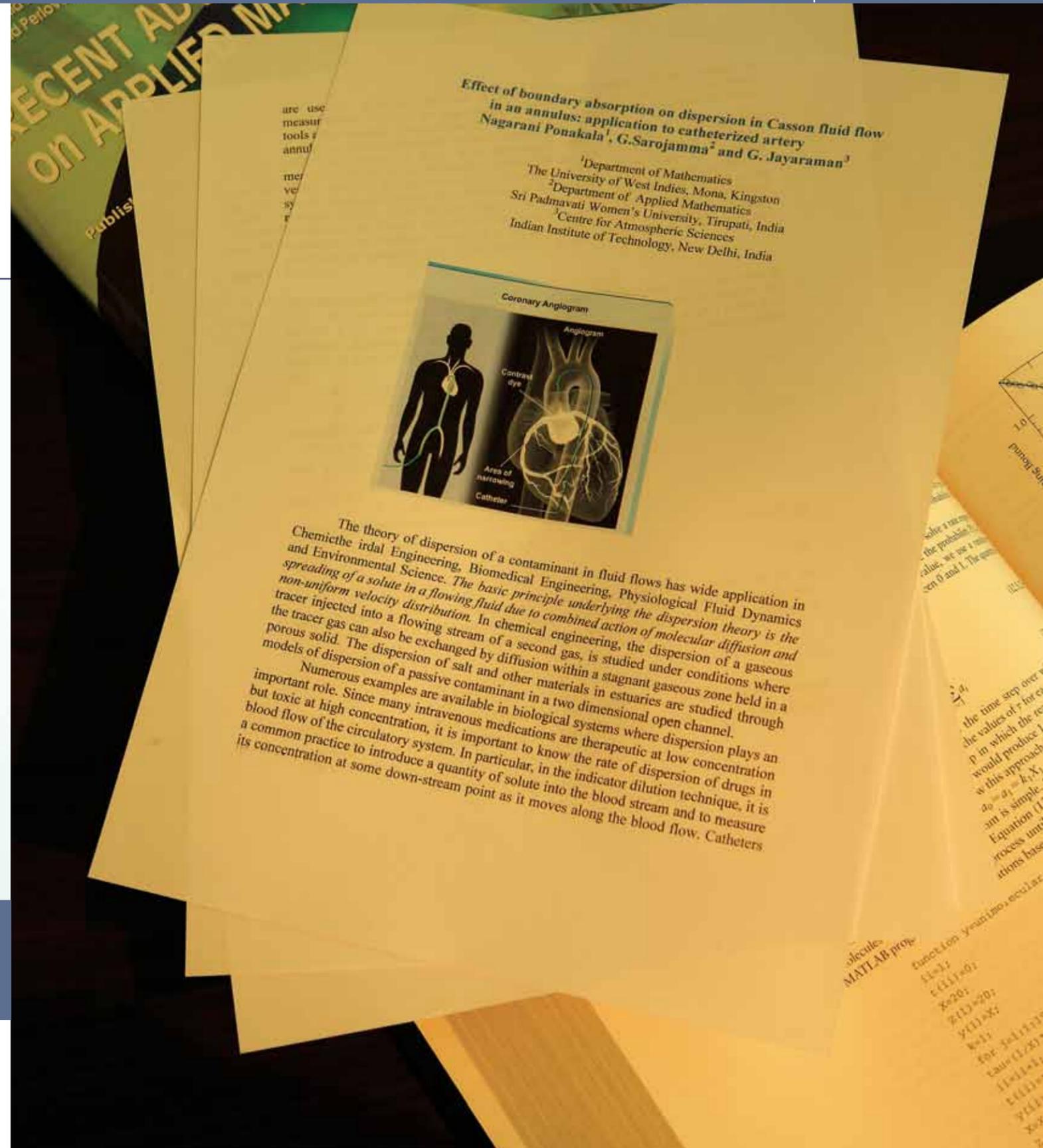
Numerous examples are available in biological systems where dispersion plays an important role. Since many intravenous medications are therapeutic at low concentration but toxic at high concentration, it is important to know the rate of dispersion of drugs in blood flow of the circulatory system. In particular, in the indicator dilution technique, it is a common practice to introduce a quantity of a dye into the blood stream and to measure its concentration at some down-stream point as it moves along the blood flow.

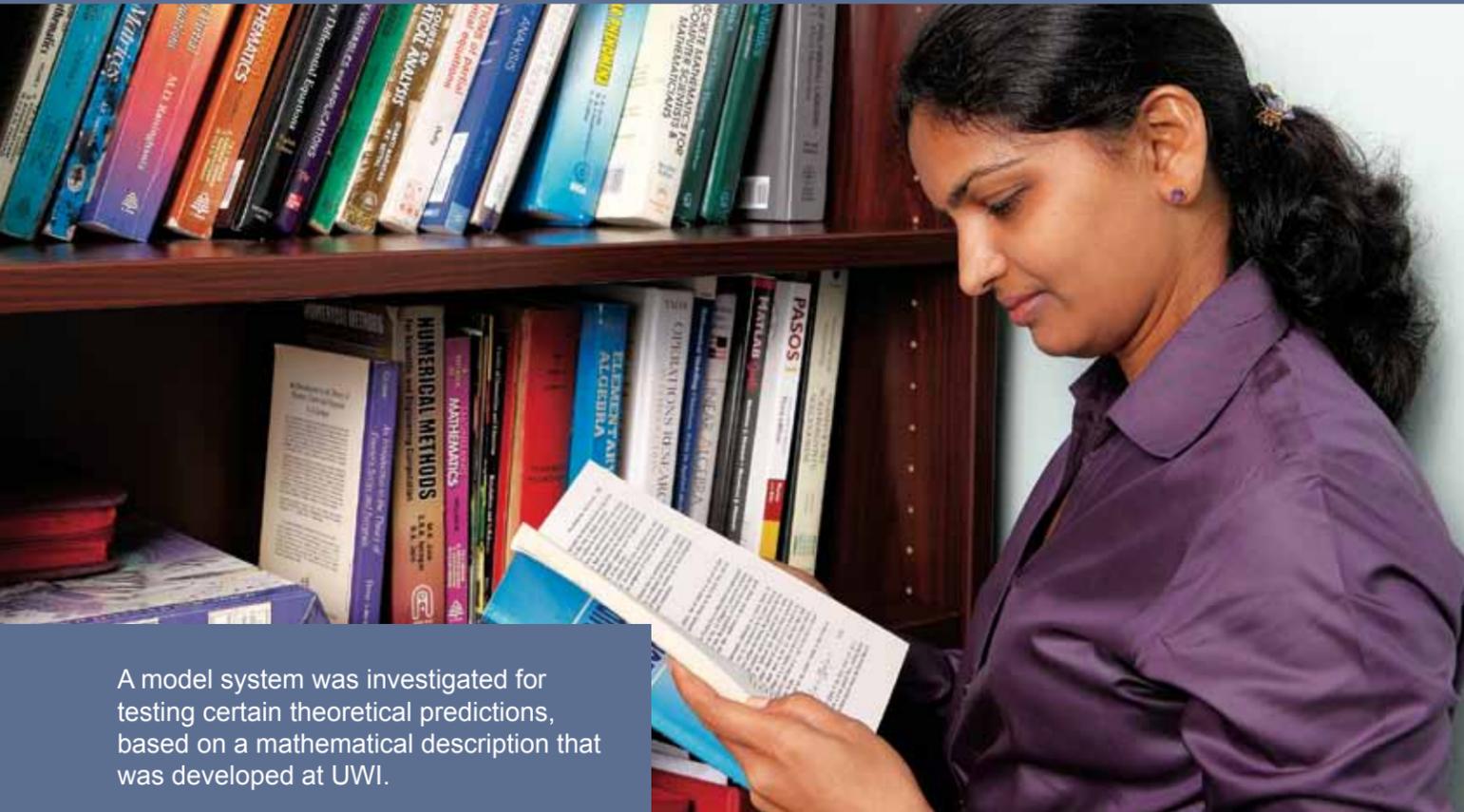
USE OF CATHETERS

Catheters are used to inject the dye and to withdraw blood samples for the purpose of measurements. Catheters are long cylindrical tubes at the tip of which various functional tools are positioned. The insertion of a catheter into an artery leads to the formation of an annular gap between the artery wall and catheter wall.



Dr. Ponakala is interested in understanding the effects of catheter insertion in fluid flow in the cardiovascular system.





A model system was investigated for testing certain theoretical predictions, based on a mathematical description that was developed at UWI.

Dr. Ponakala is interested in understanding the effects of catheter insertion in fluid flow in the cardiovascular system. The introduction of a catheter into blood vessels can be a potent cause of disturbance of natural fluid flow and mixing of blood. The sampling system always introduces some distortion in the time-concentration curve, so that the recorded curve is not of the same shape as the original time-concentration relation at the withdrawal site. Hence, the aim of this study is to provide a correction to the values measured when a catheter is inserted in the artery, based on the concept of dispersion theory.

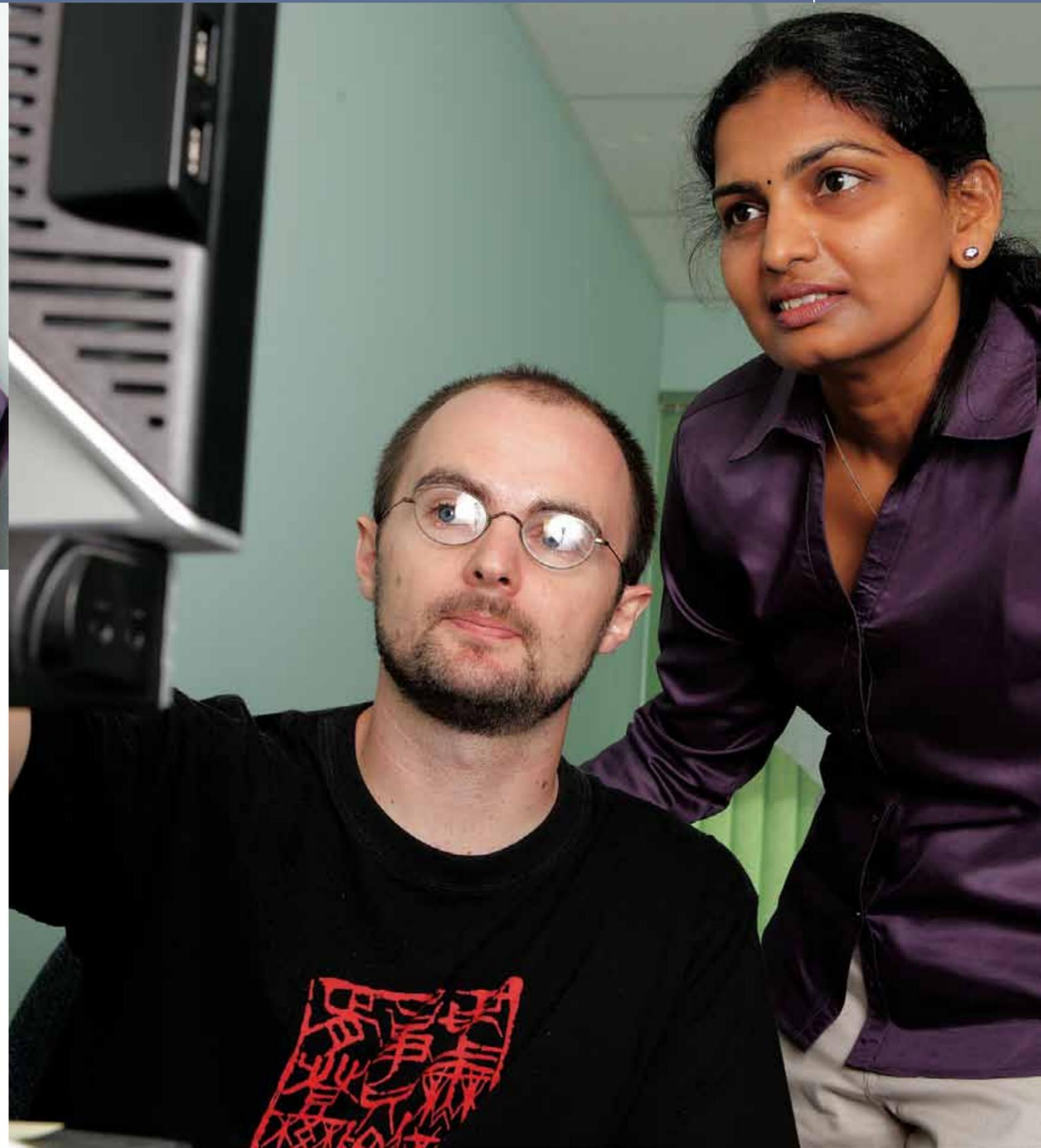
RESULTS AND APPLICATIONS

Considering the wall absorption characteristics, the entire dispersion process is characterized by the three transport coefficients viz. absorption coefficient, convection coefficient and dispersion coefficient. The results that we obtained are discussed in applications to a catheterized artery and compared with the case of normal artery where there is no catheter. The coefficients of convection and dispersion are found to be affected significantly by the presence of a catheter and property of the fluid (yield stress). The yield stress is found to have no

effect on the absorption coefficient. The combined effect of the presence or increase in the radius of the catheter and yield stress is found to inhibit the dispersion coefficient. It is seen that the presence of a catheter and increase in the catheter size helps in the dyes or other solutes to get off the blood vessels for all values of the absorption parameter. The coefficients of convection and dispersion are found to be affected significantly by the presence of a catheter and the yield stress of the fluid. Although the present study brings out the effects of wall absorption and yield stress on dispersion in a catheterized artery, the model has to be further redefined for the analysis of dispersion process when the catheter is not centrally positioned in the artery, which will be more realistic and that work is under progress.

Acknowledgments: Dr. Ponakala would like to thank her collaborators Prof. G. Sarojamma, gsarojamma@hotmail.com, and Prof. G. Jayaraman girija.jayaraman@gmail.com, for their encouragement and timely guidance in her endeavor.

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The anthocyanins and other phenolics which are present in blackberries and raspberries are important due to the health-beneficial effects associated with their antioxidant, anti-inflammatory and chemopreventative properties.

that grow wild, and conducting research into their health-beneficial properties and biologically active constituents. The research has the potential to lead to the discovery of new plant sources that may be used in the treatment of disease, as well as the development of value-added food products of health benefit to consumers in Jamaica, the region, and beyond. This research should contribute significantly to our food and agricultural industries and may also have a positive impact on the pharmaceutical industry.

JAMAICA'S BLACKBERRY AND RASPBERRY FRUITS

Blackberries and raspberries are from the *Rubus* genus, which consists of 250 species of plants. These and other small fruits have been gaining popularity in the diet due to their possession of natural antioxidants and other non-nutrient phytochemicals which improve health. The anthocyanins and other phenolics which are present in blackberries and raspberries are important due to the health-beneficial effects associated with their antioxidant, anti-inflammatory and chemopreventative properties. Five *Rubus* species are found in Jamaica: one produces blackberries and four bear raspberries. All are edible, yet none of these species is well-known.

STUDY OF THE RED RASPBERRY – RUBUS ROSIFOLIUS

Rubus rosifolius is a red raspberry found in the Caribbean, Hawaii, Australia and Asia. Also called the West Indian raspberry, it is one of the many fruit-bearing plants in Jamaica that is underutilized, being known and eaten by only a minority of the populace. It grows wild in the cooler hilly areas at elevations between 1500 and 3000 feet. This species was the first among the group to be studied, as it was the most available at the time of sample collection. It is the first time that the red raspberry was being studied in Jamaica.

When *R. rosifolius* fruits were extracted it was found that all three extracts exhibited antioxidant activity. The extract showing the greatest activity was subjected to further investigation and eight phytochemicals were isolated and for the first time reported from *Rubus rosifolius*. Additionally, one of the compounds was, for the first time, reported from this group, the *Rubus* genus.

BIOLOGICAL ACTIVITIES OF PHYTOCHEMICALS FROM RASPBERRIES

The compounds were tested for antioxidant, anti-inflammatory and anticancer activities. Four of the compounds isolated from *R. rosifolius* exhibited good antioxidant activity, comparable to that of carotene, a powerful antioxidant found in foods such as carrots. Three compounds showed low to moderate anti-inflammatory activity, and two compounds demonstrated anticancer activity, moderately inhibiting the growth of human colon cancer cells.



RASPBERRIES – GOOD FOOD

These results demonstrate that red raspberries and their phytochemicals have the potential to improve health. They also demonstrate that *R. rosifolius* is a local fruit that possesses good biological properties. Consequently, its consumption has the potential to promote health, and should therefore be encouraged. These findings suggest that *R. rosifolius* would be a good crop for cultivation and processing into products such as juices, jams, wines, ice cream, yoghurt, to name a few. The cultivation of this crop and subsequent processing into value-added products would involve farmers, agricultural scientists and food processors. This research therefore has the potential to positively impact our agricultural and food industries, and improve the health of our people.

This research was done in collaboration with Prof. Muraleedharan Nair of the Michigan State University.

Camille Bowen-Forbes is a lecturer in the Department of Chemistry, UWI, Mona and has a strong interest in food chemistry and its practical applications.
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Dr. Paula Tennant

Department of Life Sciences

Management of Plant Virus Diseases

Virus diseases of fruit trees are responsible for severe crop losses, reduced commercial productivity and quality. Measures for controlling these diseases are generally based on prevention rather than treatment and as such focus on plant resistance through conventional breeding methods and more recently through biotechnology.

CONVENTIONAL BREEDING METHODS

Traditionally, plant breeding involves the identification and selection of desirable traits in plants and combining these into one individual plant. Some traits, including virus disease resistance, few useful traits have been identified and only a limited number of commercial crop cultivars and rootstocks exhibit transferable characteristics. The development of crop plants through agricultural biotechnology has thus become an important strategy to implement effective and sustainable control measures in these instances.

BIOTECHNOLOGICAL METHODS

Development of crop plants through agricultural biotechnology involves the transfer of the genetic material responsible for a trait (that is, a gene) from one organism to another. The process is referred to as genetic engineering. Organisms modified in this way, are referred to as transgenic, genetically modified or simply as GMOs. Through this method, there can be the addition or alteration of an individual trait without the transfer of undesirable traits. Moreover, the plants need not be sexually compatible as is required by traditional methods of crop improvement.

UWI PRODUCING VIRUS DISEASE-RESISTANT PLANTS

Two projects with papaya and citrus that utilise both traditional and biotechnological methods for the development of new virus resistant varieties are in progress in the Department of Life Sciences and the Biotechnology Centre, in collaboration with the Departments of Biochemistry and Chemistry. Improved virus detection techniques and virus control programmes will enable farmers to find new solutions to problems of propagation and production.



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Safety studies with animal models also show that there are no detrimental effects associated with the consumption of the transgenic papaya.

PAPAYA

Papaya, an essential part of the diet in many tropical and subtropical regions, is a relatively new product on the international market. Commercial production of papaya in Jamaica since the mid 1980s has exceeded 20,000 metric tonnes. However, the industry is threatened by the papaya ringspot virus disease. As the name suggests, diseased trees produce fruits with ring-spotting blemishes and the leaves develop mosaic patterns resulting in a general decline in tree vigour and fruit production. Natural genetic resistance is not available in commercial papaya cultivars. Using biotechnological methods, a gene of the virus was transferred to papaya to confer virus resistance. Promising cultivars have undergone some four years of field-testing. They exhibit varying levels of resistance against virus infections. Moreover, selected nutritional components (for example, vitamins, minerals, acidity, and sugars) of the fruits are comparable to those of conventional papaya cultivars. Safety studies with animal models also show that there are no detrimental effects associated with the consumption of the transgenic papaya.

CITRUS

Although relatively small in absolute trade and production volumes, the citrus industry in Jamaica plays an important role in the country's national economy. Jamaica presently produces Sweet oranges, Ortaniques, Grapefruit and Ugli on some 30,000 hectares situated across all 14 parishes. Fresh fruit or processed fruit are exported. However, since the mid 1980s, there have been numerous reports of decline in fruit production.

CITRUS DISEASE

One of the prevalent viruses thought responsible is *tristeza* (which means "sadness" in Spanish). The disease is caused by a virus, *Citrus tristeza virus*, which similar to *Papaya ringspot virus*, is spread by aphids but also by the use of infected scion materials at grafting. Two severe economical strains of *Citrus tristeza virus* cause decline syndromes and stem pitting disease. Given the complex biology of citrus, however, breeding by conventional methods is difficult and few cultivars are available.

Moreover, the virus has evolved a defense system that targets and overcomes resistance mechanisms in plants. *Citrus tristeza virus* represents the biggest threat to the Jamaican citrus industry because 90% of the citrus orchards are established on the susceptible sour orange rootstock and the insect vector of the virus is distributed throughout the island. A study of CTV strains in Jamaica has been initiated with the long-term aim of reducing losses in fruit quality and production. The widespread distribution of severe CTV strains was found, thus emphasizing the need for continued testing and removal of CTV-infected trees. Eventually, virus resistant varieties developed through agricultural biotechnology will be investigated as means of managing the pathogen.

Paula Tennant is senior lecturer in the Department of Life Sciences. Over just the past year, she has co-edited five international scientific volumes in the area of Biotechnology; and authored six scientific papers which appear in reputable, peer-reviewed journals. Her work is supported by external local and international grants. Dr. Tennant works along with Dr. Wayne Mc Laughlin (Basic Medical Sciences), Dr. Minott-Kates (Chemistry), Dr. Andrew Wheatley (Basic Medical Sciences), Dr. Nadia Williams (Pathology, UHWI), Dr. Sylvia Mitchell (Biotechnology Centre) and Dr. Latanya Fisher (Life Sciences). paula.tennant@uwimona.edu.jm



Dr. Judith Mendes

Department of Life Sciences

Using Education to Save the Caribbean's Coral Reefs

CARIBBEAN CORAL REEFS ARE DYING

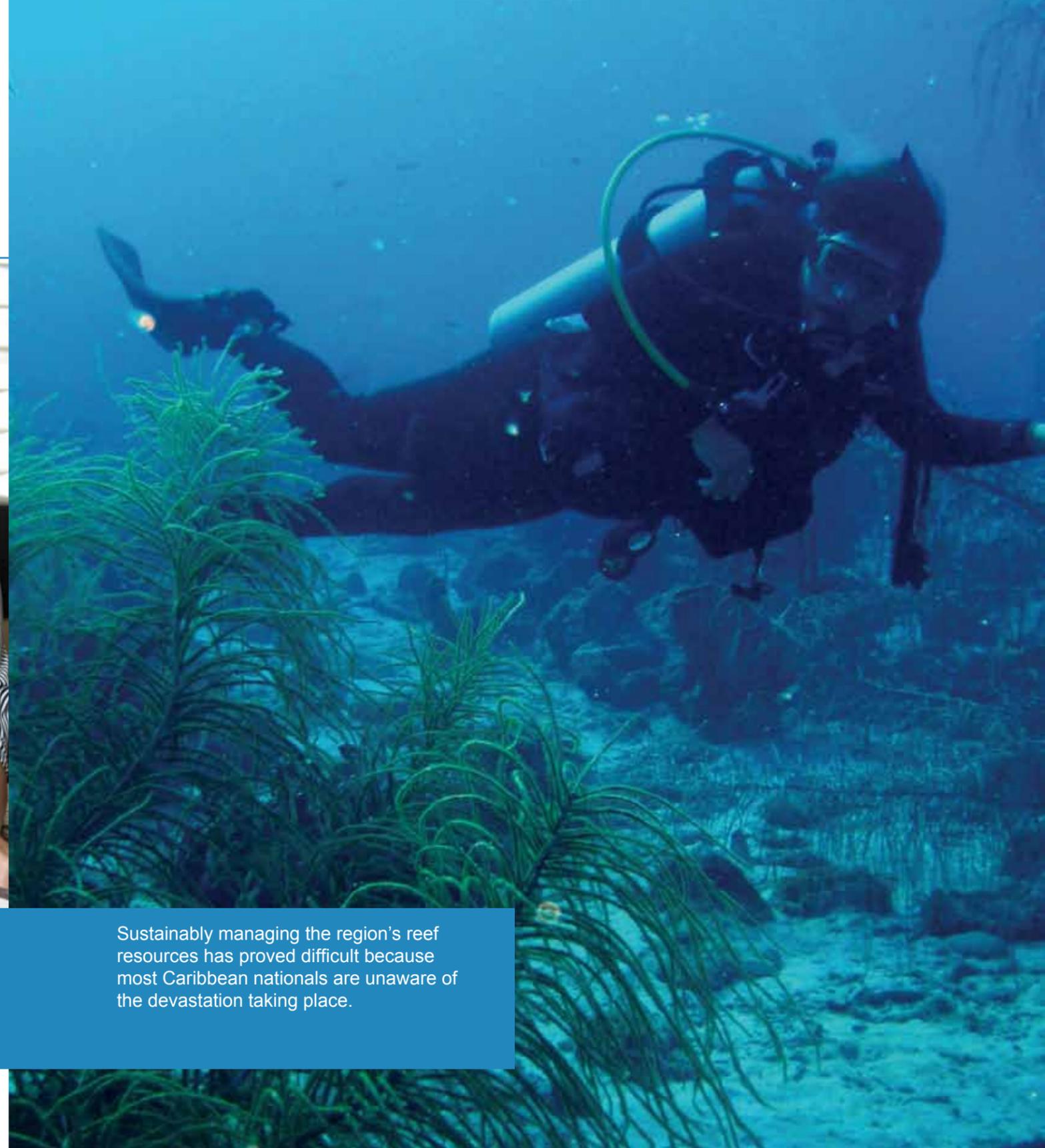
Coral reefs are the foundation of the Caribbean's tourism and fishing industries, accounting for a sixth of the region's jobs, and a third of its income (or US\$15 billion) per year, and 500,000 tonnes of its food. Caribbean reefs, however, are suffering so terribly from the effects of overexploitation, pollution and climate change that it is predicted that all the region's corals may be dead within 40 years. Sustainably managing the region's reef resources has proved difficult because most Caribbean nationals are unaware of the devastation taking place (with the reefs underwater being literally out of sight and out of mind). In addition, most of the region's existing reef conservation efforts are either understaffed or highly dependent on costly imported staff.

ONE PERSON CANNOT SOLVE THE PROBLEM

When I was a little girl my father took me snorkeling over the reefs at Hellshire every Sunday. Back then I did not know how important reefs were, but only that they were beautiful, with awe-inspiring colour and life. These reefs at Hellshire inspired me to become a marine biologist. There are no reefs at Hellshire now, only weed covered rocks. Throughout the course of my life I have watched them die before my very eyes. My individual actions as a scientist studying corals did not help to save them. Consequently, I designed a course and started to teach coral reef biology in the hope that some of my students would join the effort to conserve the Caribbean's reefs. This, though, proved difficult as there was no textbook that focused on Caribbean corals or reefs, and because the numbers of students that I alone could reach was very small. Hoping to reach a larger audience, and so bring about a greater change, I wondered if I was the only university lecturer in the Caribbean battling for this cause. As it turned out, I was not. There were a few Caribbean lecturers trying to teach coral biology around the region, all of whom were facing the same problems I was. I felt that while we were individually incapable of overcoming problems like the lack of a region-specific text for our courses, we could overcome these obstacles if we worked as a team.



There are no reefs at Hellshire now, only weed covered rocks. Throughout the course of my life I have watched them die before my very eyes. My individual actions as a scientist studying corals did not help to save them.



Sustainably managing the region's reef resources has proved difficult because most Caribbean nationals are unaware of the devastation taking place.

THE CREATIVE PROJECT

The Caribbean Reef Education and Training Initiative (CREATlve) will solve many of the problems faced by coral reef lecturers living and working in the region. The US\$ 715,000 project is funded by the ACP-EU Cooperation Programme in Higher Education (EDULINK), a programme of the ACP Group of States with the financial assistance of the European Union.

CREATlve is a co-operative effort by three universities (The University of the West Indies, The University of Belize, and The College of the Bahamas) in five Caribbean countries (The Bahamas, Barbados, Belize, Jamaica, and Trinidad and Tobago). CREATlve's Caribbean-wide approach is essential because the region's reefs are intimately connected by the waters of the Caribbean Sea, and problems (such as diseases of marine life) in one area usually spread rapidly to other locations via sea currents. Thus, without region-spanning management of reef-resources, successes by individual countries will not stem the decline of the region's reef systems as a whole.

CREATlve will build the skills of ten educators already working at regional universities by having the lecturers train themselves and then pass on their newly-acquired knowledge to their peers. The self- and peer-trained lecturers will then write the first university-level text that addresses coral biology and management from a Caribbean perspective, and develop the first region-wide, degree-level course on the subject. The CREATlve text and course will be made available to at least 75 Caribbean students by the final year of the project (and every year thereafter).

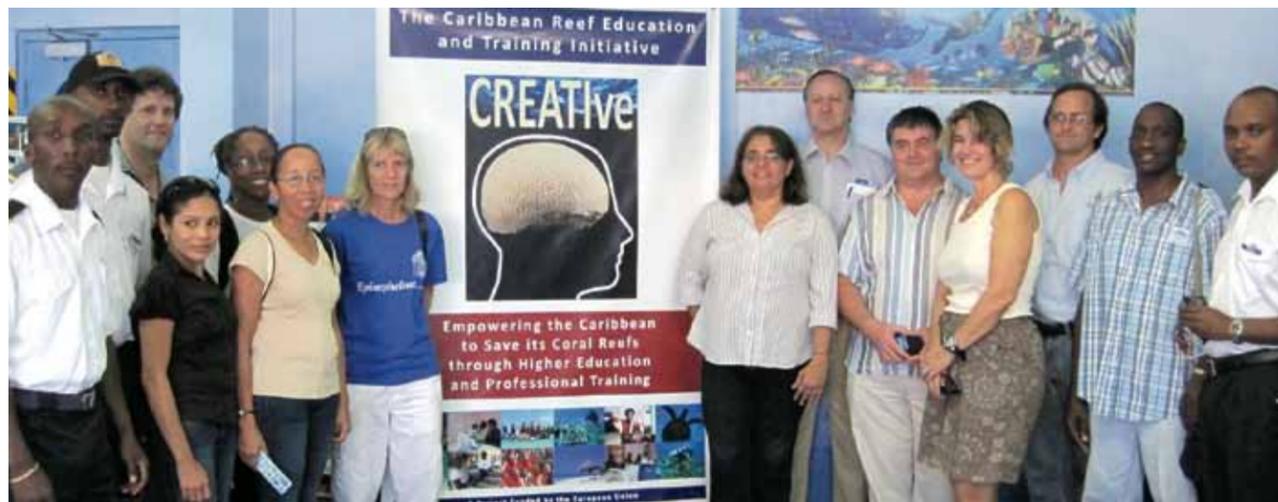
THE BENEFITS OF THE CREATIVE PROJECT

In this way, CREATlve will not only strengthen the capacity of Caribbean universities, but also increase the number of skilled Caribbean professionals with knowledge of coral biology and conservation methods. CREATlve will therefore provide the region with the skilled workforce it needs to achieve long-term conservation of its coral reef resources, to conduct vital new research, and to sustain economically-important, reef-dependant industries, like tourism and fishing. Indeed, if CREATlve's graduates bring about a mere one percent increase in the Caribbean's reef resources, the region would earn an additional US\$ 150 million per year.

Judith Mendes, a coral biologist and avid SCUBA diver, is the Coordinator of the CREATlve project. She lectures in the Department of Life Sciences on the UWI's Mona Campus and is also the Director of the Bellairs Research Institute of McGill University in Barbados. judith.mendes@uwimona.edu.jm

The other members of CREATlve's project team are:

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Dr. Anthony Greenaway

Department of Chemistry

Improving Process Efficiency of Jamaican Bauxite

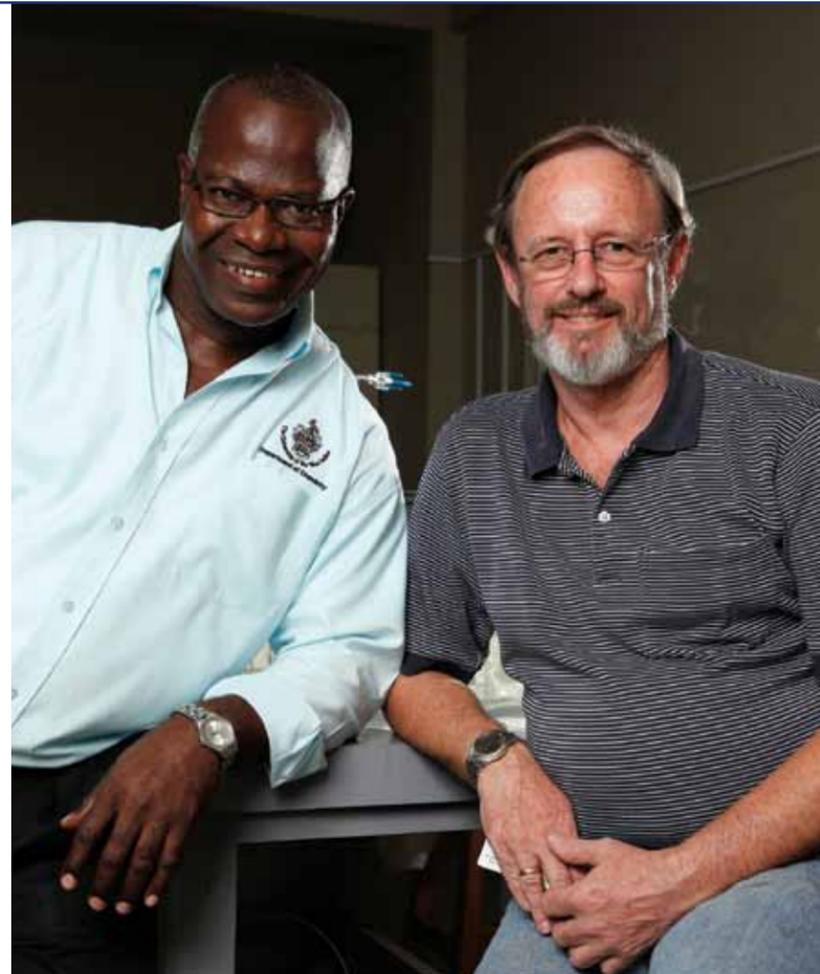
Bauxite is one of Jamaica's most important natural resources. There are large deposits of bauxite in the parishes of St. Ann, Manchester, St. Elizabeth and Trelawney and smaller amounts in St. Catherine and Clarendon. These deposits are mined to support the operations of Jamalco in Clarendon, Alpart in St. Elizabeth and the Windalco plants at Ewarton in St. Catherine and Kirkvine in Manchester. These plants process bauxite to produce alumina for export whereas the fifth bauxite plant, St. Ann Jamaica Bauxite Partners exports raw bauxite ore for processing overseas.

ECONOMIC IMPACT

The Bauxite-Alumina industry is very important to the Jamaican economy. Over 3,400 workers are employed to the industry when all five plants are in operation. In addition, up to recently the industry accounted for over 50% of Jamaica's total export and was the country's second largest foreign exchange earner.

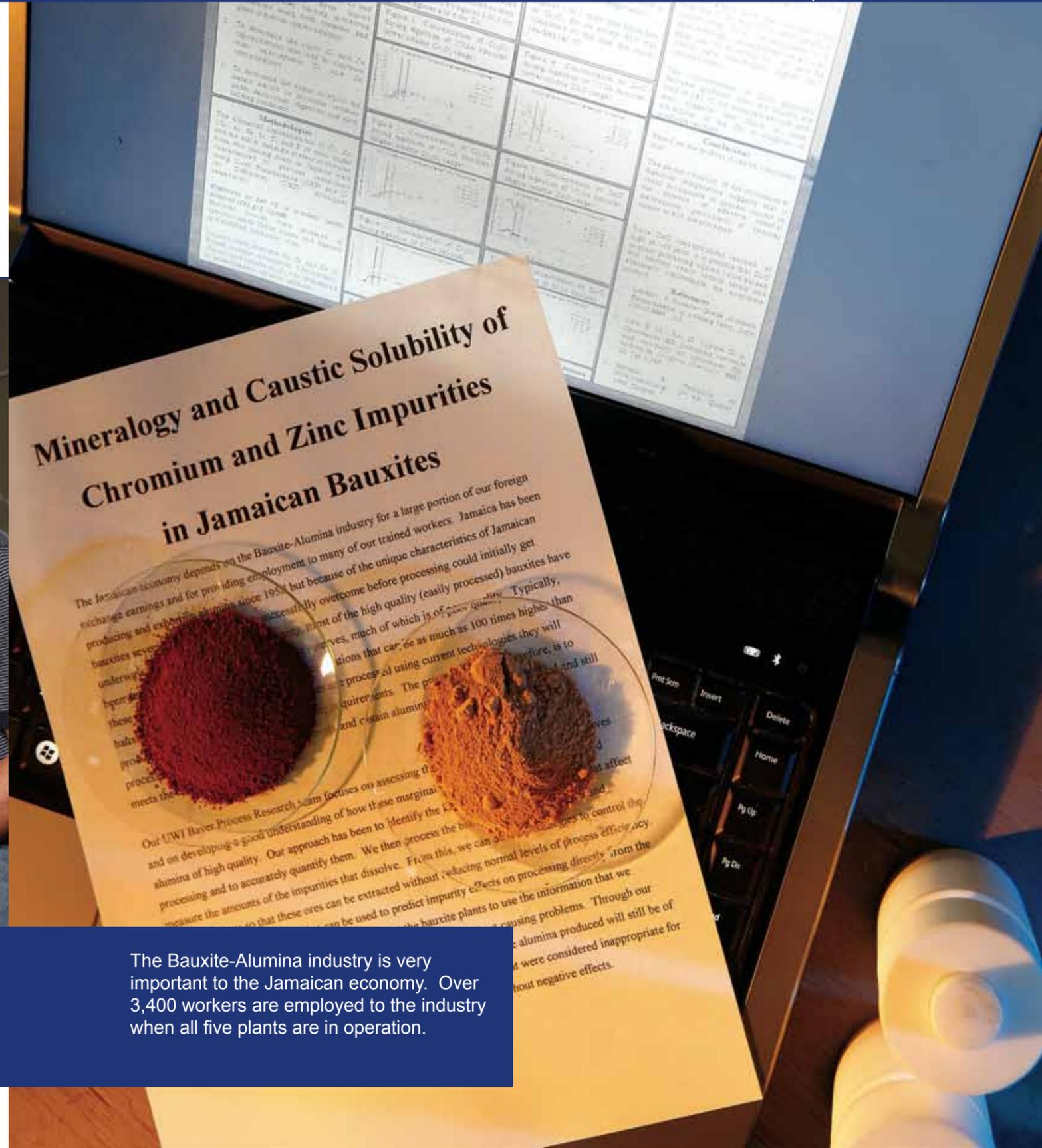
MARGINAL BAUXITE QUALITY

Jamaica has been exporting bauxite and alumina since 1952 and for many years Jamaica was the leading bauxite producer in the world. During the more than fifty years of bauxite mining, most of the high quality, easily processed bauxite has already been mined. Much of the reserves that remain is of marginal quality and must be blended with higher quality ore if it is to be processed. In some

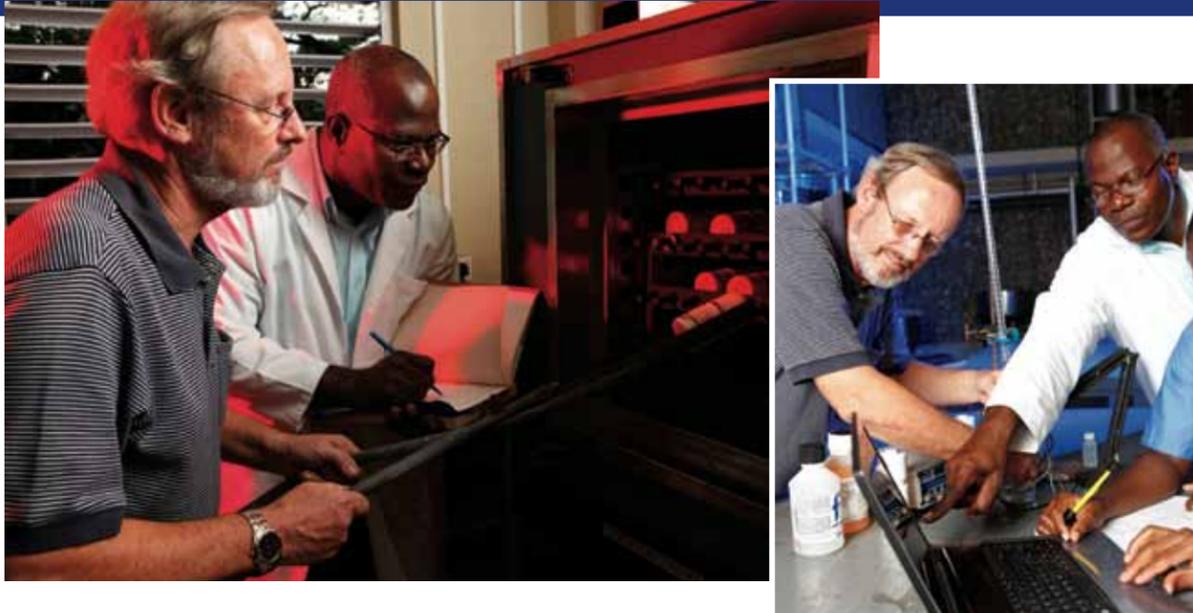


Coley | Greenaway

The researchers documented the properties of bauxite from both current and future mining areas and selected about 100 samples from each for detailed study.



The Bauxite-Alumina industry is very important to the Jamaican economy. Over 3,400 workers are employed to the industry when all five plants are in operation.



cases, these marginal ores contain impurities (such as silica, phosphate and iron-containing minerals) at concentrations that are as much as 100 times higher than bauxite from other countries.

If these bauxites are processed using current technologies, the alumina produced may not meet required purity standards. The challenge therefore is how to process bauxite that has high impurity levels and obtain alumina that is still suitable for the export market. This must be done while keeping the cost of production low, so that Jamaican alumina will remain competitively priced.

THE EXPERIMENTAL APPROACH

In response to these challenges, the UWI Bauxite Process Research team worked closely with industry experts to design a project to tackle the problem. Working along with our graduate students, we examined data for over 19,000 bauxite samples that were taken from areas that will be mined in the future. We compared these mostly marginal bauxites with thousands of samples taken from current mining areas from which bauxite was being satisfactorily processed into alumina. We documented the properties of bauxite from both current and future mining areas and selected about 100 samples from each for detailed study.

In our laboratories, each sample is processed in a way that gives information on how it would behave during processing in the industrial bauxite plant. We then measure the amounts of impurities that dissolve and study the various reactions that occur. From these, we develop ways to control the effects of certain impurities. We also use the information to predict how bauxite with different properties would behave during processing in the industrial plant.

ECONOMIC IMPACT

As a result of our work, engineers at industrial bauxite plants can use the information we generate to select bauxite that can be processed without causing problems. Similarly, ores that will disturb plant operations can be easily avoided. Methods for controlling certain impurities have also been developed and these are likely to lead to greater efficiency in processing local bauxite.

Through our efforts, more of Jamaica's bauxite will be processed into alumina and the product made will still be of the required quality. Already, we have identified bauxite deposits that were considered unsuitable for mining and have shown that they can be processed successfully without negative effects.

Careful study of Jamaica's bauxite is critical if our industry is to remain globally competitive. Much of Jamaica's future bauxite are of marginal quality and will be challenging to process. However, our UWI team is committed to carrying out the research necessary to develop new technologies to ensure that these resources can be processed in an effective and environmentally friendly way.

The researchers wish to acknowledge The UWI and Alcoa World Alumina, Australia, for funding support.

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Faculty of Social Sciences



Dr. Densil Williams

Department of Management Studies

Understanding Exporting in the Small and Micro Enterprise

Over the last 3 years at UWI, Dr. Densil Williams has focused his research on why some small firms are engaged in international business while others, with similar characteristics and facing similar market conditions do not. Because of globalization, no firm can operate successfully without interacting with the global market place. It is therefore important that public policymakers, managers and owners of the small firm know what resources are needed to help them to better operate in the international market place.

HOW TO BECOME COMPETITIVE

The body of work on small business international operation that he has been doing over the last three years provides some insights into the types of characteristics that are more amenable to getting smaller firms to go international. The work drew on a sample of small firms in the manufacturing and agricultural sectors in Jamaica and analyzed data on their international business performance. The results revealed that the owner of the business needs to possess following the characteristics in order to be competitive:

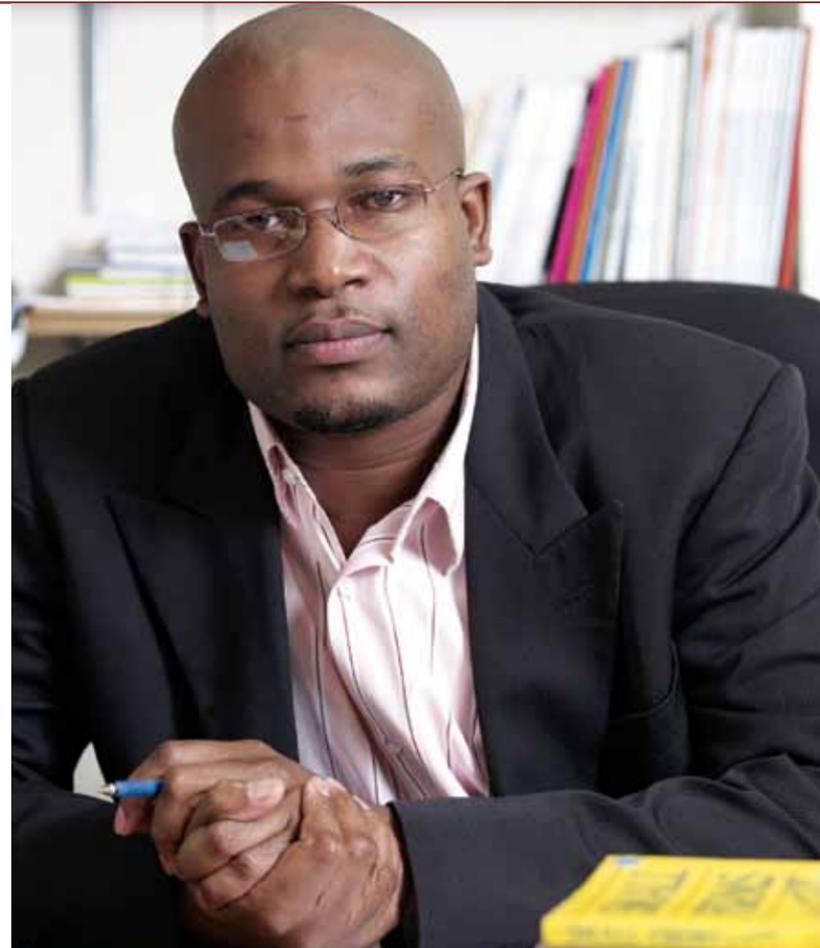
- An international orientation
- Networking skills
- Adaptability to new ideas
- Adroit leadership

AN INTERNATIONAL ORIENTATION

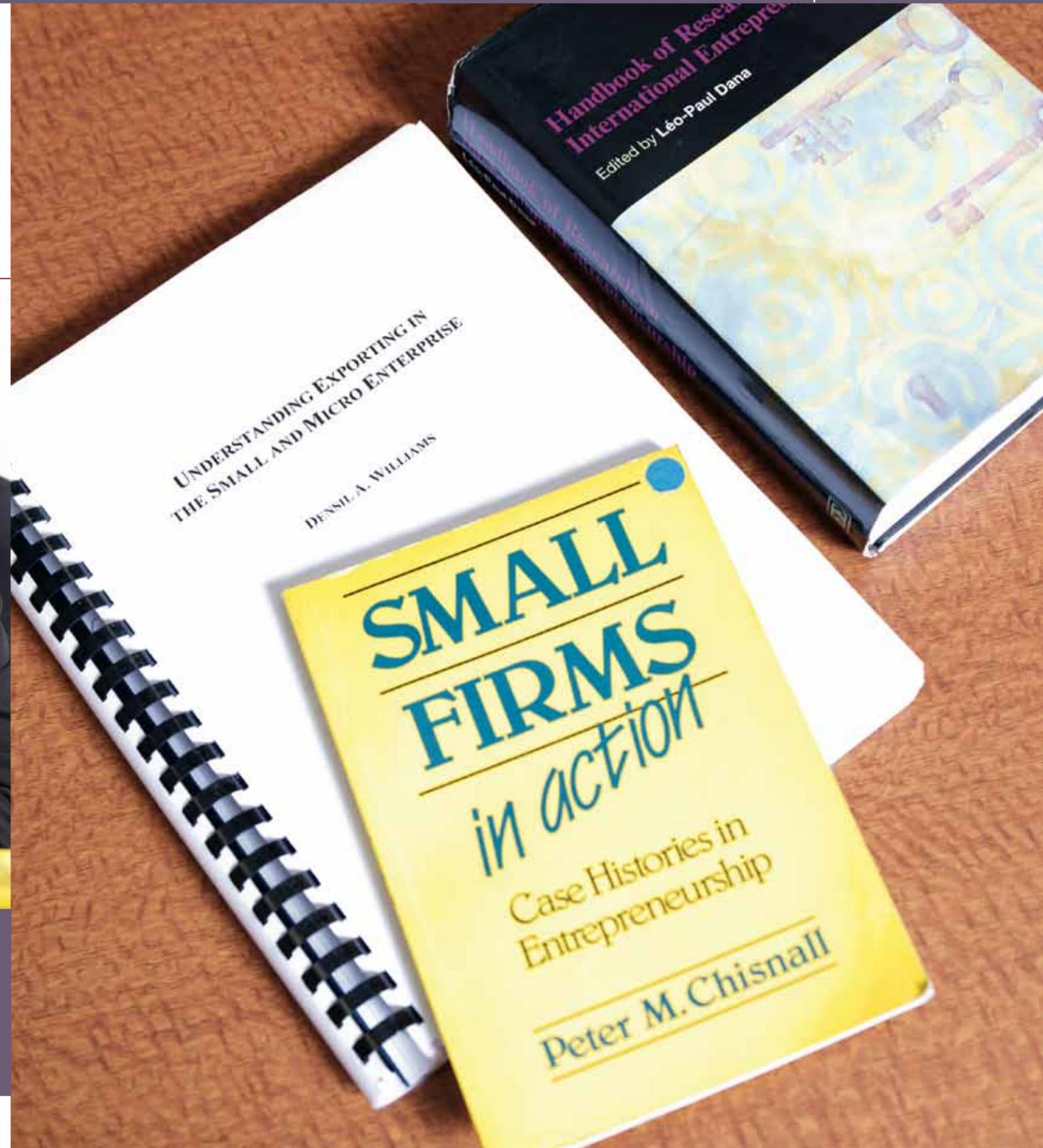
In the globalized world where opportunities are limitless, the owner of a small business needs to look beyond the borders of his/her own country to find opportunities that lie in the wider world and take advantage of them.

NETWORKING SKILLS

The owner needs to be a member of an organization that can allow him/her to gain access to resources such as information, finance, intellectual capital that he/she would not otherwise have.



The body of work on small business international operation that he has been doing over the last three years provides some insights into the types of characteristics that are more amenable to getting smaller firms to go international.





ADAPTABILITY TO NEW IDEAS

The owner must be willing to accept new ways of doing business more efficiently in an increasingly competitive business environment.

ADROIT LEADERSHIP

The owner must have a vision of where he wants the business to go and motivate the employees to achieve that vision.

HELPFUL INFORMATION FOR POLICYMAKERS

Public policymakers can use these findings to design profiles of business that should be targeted for assistance to go international. This will reduce drastically, the level of wastage of needed resources because only strong candidates would be targeted. Managers and owners of the small firms need to harness these resources so as to increase their chances of entering international markets. These resources are easily identifiable and so they can be targeted and become a part of the firm's resource stock quite easily.

Densil Williams is a lecturer in the Department of Management Studies. He has a strong research interest in the management of small businesses.

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Dr. Mark Figueroa

Dean, Faculty of Social Sciences

George Cumper and the Critical Tradition: Common Themes in Post World War II Caribbean Thought

FOCUSING ON OUR DIFFERENCES?

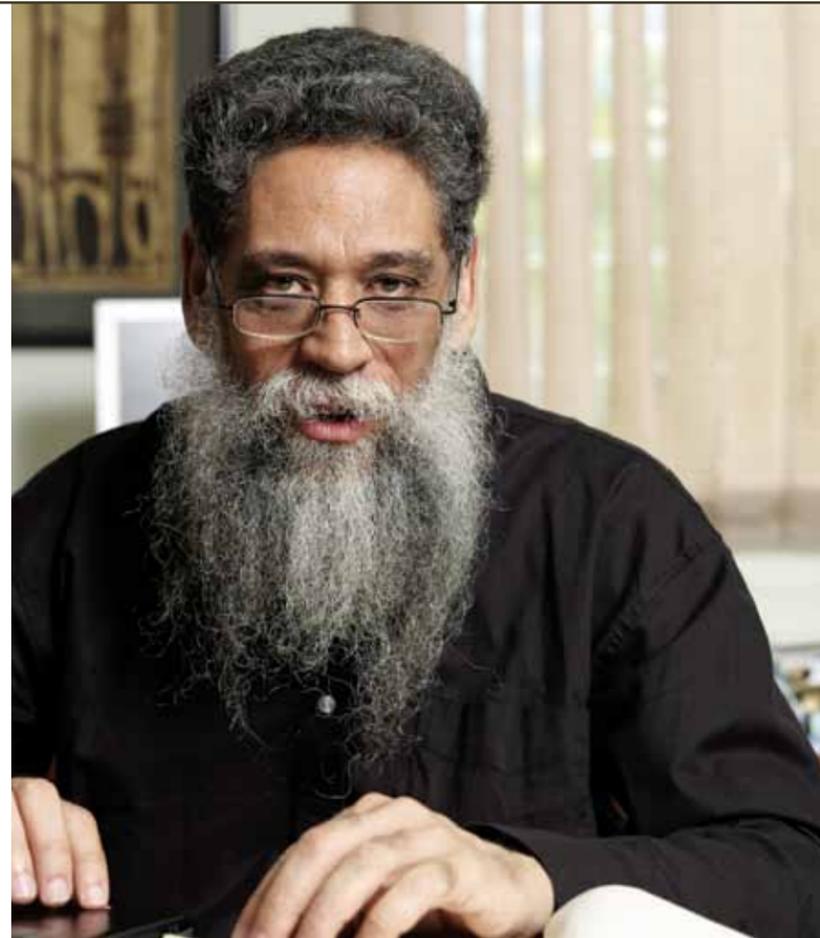
The question is often asked as to whether we spend too much time, in Jamaica and the Caribbean, focusing on our differences even when we have a common agreement on the most important things? Are we too contentious in dealing with each other? These are questions that have been asked with respect to various aspects of our society. In this article, Mark Figueroa considers whether Caribbean economists have been guilty of this same type of behaviour.

EXAMINING GEORGE CUMPER'S WRITINGS

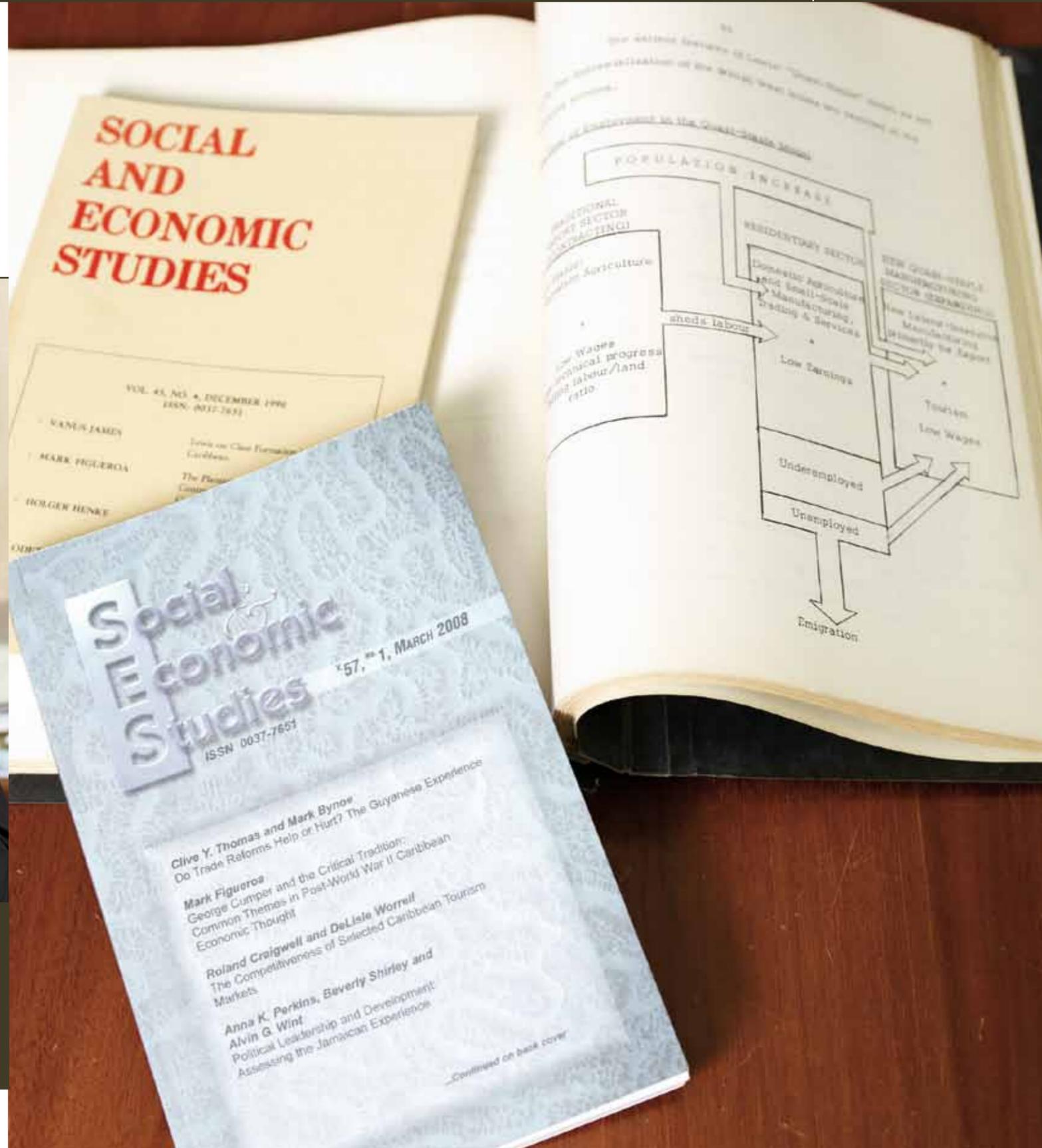
The article takes as its starting point, the work of one author – George Cumper, who helped to establish the study of economics in Jamaica and the English-speaking Caribbean. He was seen by many as one of the more conservative economists. To get to the point of the article, his work is therefore compared with the most radical trends in Caribbean thought which have been placed together under the common label: "The Critical Tradition". The result may be surprising to some but Figueroa demonstrates convincingly that there was far more in common between Cumper and the Critical Tradition than there were differences.

FROM ENGLAND TO JAMAICA

Cumper actually started his life without any direct connection to the Caribbean. He was born in Burton on Trent, England, in 1924 but while studying at Cambridge University he met Gloria Carpenter (a prominent social reformer in pre and post Independence Jamaica). They were married in 1947 and established their home in Jamaica in 1948. He later became a citizen and died in 1993 at Stony Hill, Jamaica.



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DEVELOPMENT OF THE REGION

Along with other Caribbean economists, he shared a passion for the development of the region and for the creation of appropriate theoretical tools and practical policies to improve the conditions of its people. They had a shared vision that it was possible to transform the region in a generation or two. The methods that they adopted had much in common; they placed great importance on the consideration of social, political and cultural issues and were critical of any perspective that was too narrowly economic. On policy issues, they tended to have more differences but these differences often related more to the pace of transformation that was thought possible or desirable and less to fundamental differences relating to the analytic categories used.

Despite all these elements of unity (which include shared perspectives with respect to their vision regarding the

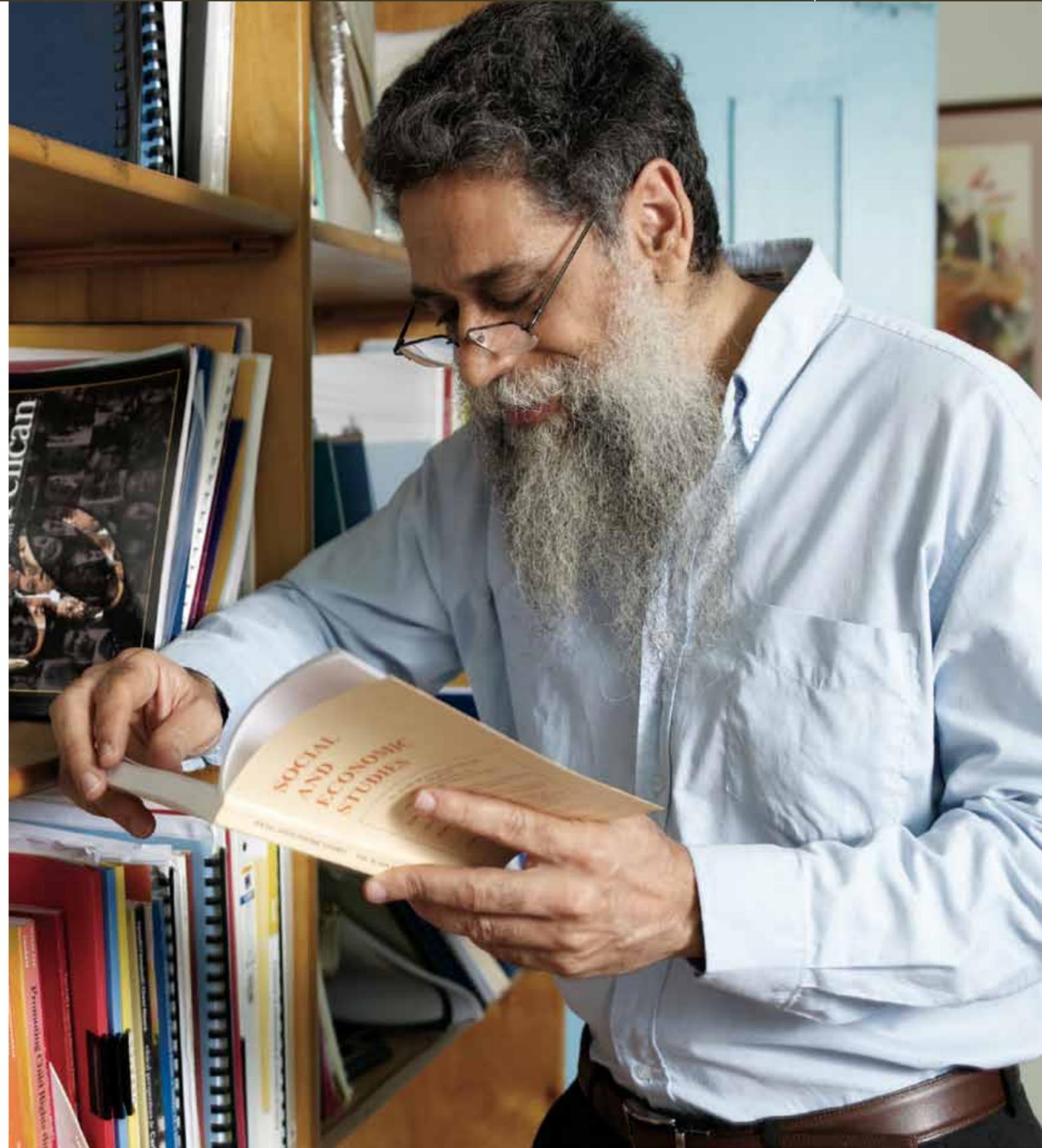
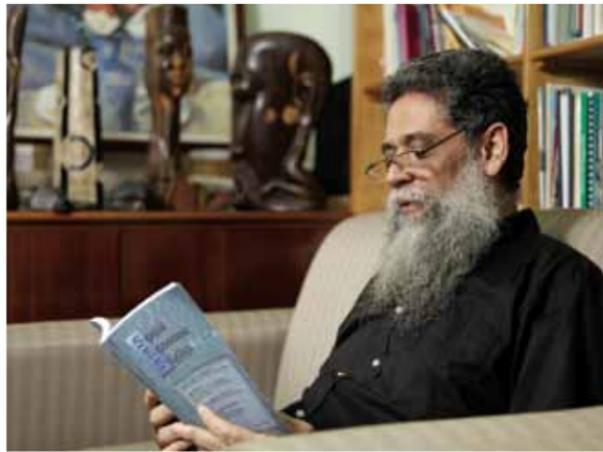
region, the appropriate methods to be adopted, the types of analytical categories to be used and even many of the policy goals), there was a strong tendency to either enter into sharp clashes on differences or to avoid dialogue completely. From this Figueroa concludes that Caribbean economists would have better served their own ends by placing more emphasis on the things that they had in common with a view to providing leadership to the society.

LESSONS TO BE LEARNT

The lesson that he draws from this study is that it should be our aim to avoid the errors of the past and to ensure that we get the full benefit of the insights that the various economic perspectives have to offer. In this way, we might have a better chance of developing appropriate theoretical tools and workable solutions that can be applied to the contemporary economic problems of the Caribbean.

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The "New Orthodoxy" of Local Governance in the Caribbean

THE RESEARCH PROBLEM

For over a decade policy-makers in the Caribbean have been engaged in reforming local government systems. These reforms have been driven by factors from two sources: (a) the mostly negative experience that local communities have with their local authorities (local government), and (b) new ideas about the best ways through which to deliver public services. These ideas are expressed using different labels but they all in some way suggest new norms about local service organization and management and political interface between local authorities and communities to achieve citizen satisfaction.

NEW INSTITUTIONAL THEORY

One body of ideas known as new institutional theory has forced Caribbean policy-makers to consider whether local services should be delivered using markets (i.e. privatization) or local bureaucracy (i.e. existing local administrative structures) or cooperative arrangements (i.e. combining local government, community and business/industry).

GOVERNANCE

Another body of ideas that has influenced reform in the Caribbean is governance of which the World Bank is the main proponent. Governance promotes ideals such as participation, efficiency and effectiveness, accountable management and respect for human rights, as the essential foundations on which public policies are to be built. Both new institutional theory and governance have led to the emergence and general acceptance of the term local governance as the ultimate goal of local government reform in the Caribbean. Not only does local governance appear in



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is made in connection with local government reform policies, it is used interchangeably with local government. However, local government and local governance describe separate and distinct political and administrative processes. This 'incorrect' usage suggests limited understanding of what the concept entails and indicates a blind transfer of the ideals of the concept to the Caribbean contexts where the social and political dynamics are not necessarily complementary to the original interpretation of the concept.

RATIONALE

The researcher's interest in how theoretical ideas shape local government policy design and implementation in the Caribbean stems first from a commitment to advance research in her area of academic specialization, which is policy research with concentration on subnational politics and administration. However, having studied this particular policy area for more than ten years it became apparent that issues beyond the broad political framework are important for understanding the pace and content of reform. The similarities across the Caribbean with respect to the use of local governance were especially appealing, which led me to explore the question of how closely aligned with policy language are policy strategies in the implementation of local government reform.

THE METHODOLOGY

The research problem was explored through the medium of a case study. The Portmore Municipal Council (PMC) was selected as the appropriate case as it represents an experiment in community self-management, co-governance and democratic local governance. Using a combination of interviews and analysis of minutes of council meetings, the research sought to find out how deeply integrated into the operations of the PMC were the values of local governance.

RESEARCH IMPACT

This research is innovative in two main ways: (a) It is the first academic study to be carried out on the design and functioning of the PMC; (b) It benchmarks the functioning of the PMC against internationally accepted standards for effective local



democratic processes; and (c) it offers real lessons for broader adoption of this type of decentralizing reform across the Caribbean. Importantly it provides policy-relevant knowledge about the concept and practice of local governance and its distinction from local government.

As such both the literature consulted and the findings will be useful tools for:

- Policy reformers/bureaucrats
- Elected representatives at local and national levels
- Local government practitioners
- University students.

Policy development processes at the local and national levels in the Caribbean should also be impacted positively through this research.

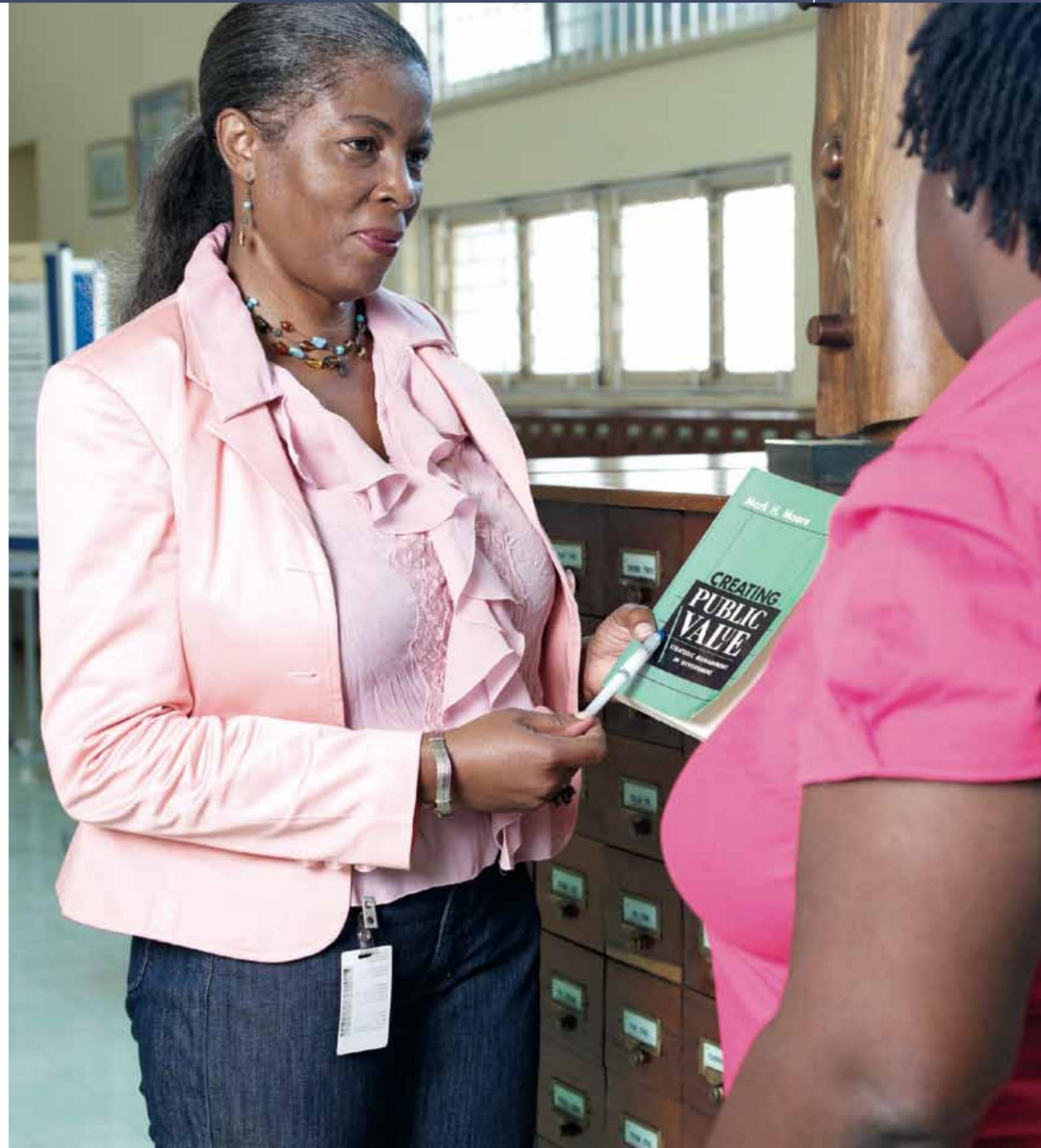
BENEFIT OF RESEARCH TO GOVERNMENT, INDUSTRY OR OTHER STAKEHOLDERS

For government, it demonstrates the importance of the need for a new kind of policy and administrative leadership for successful policy reform.

For industry and other stakeholders, it highlights the varied ways in which these categories of local actors can be integrated into local policy processes in a more balanced way.

For reformers, it provides an objective assessment of the outcomes of efforts to change local government to local governance, which revealed that the language of policy is not always supported in the strategies.

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Tackling Jamaica's Crime Problem

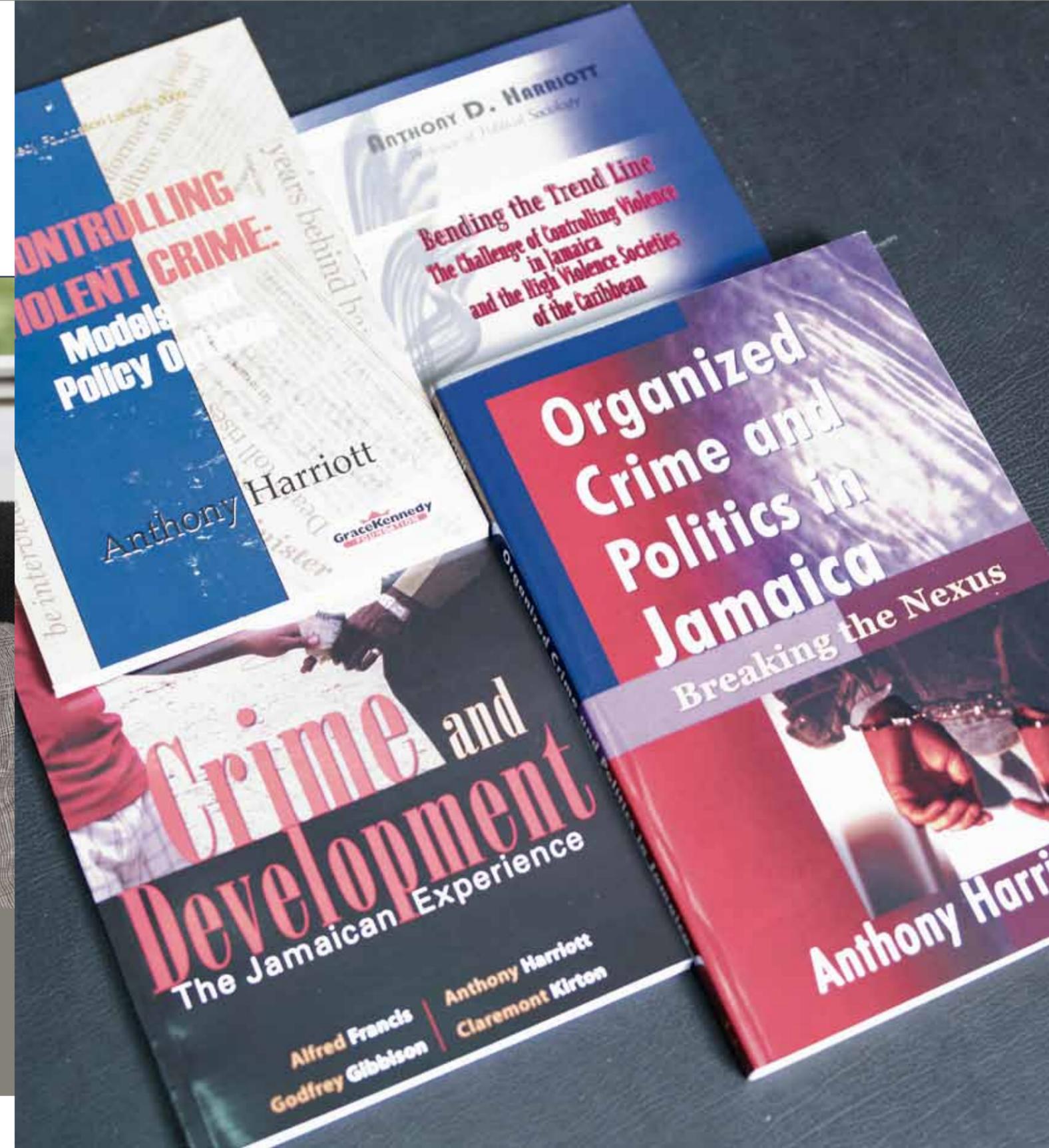
Jamaica's crime problem has continued to deteriorate. It is constantly changing. Despite the efforts of the responsible agencies as a country, we have not been able to effectively control it. These realities suggest at least three things. That we should seek to better understand this problem. That we should apply this knowledge to constantly improve the policies and strategies for preventing and controlling it. Finally, we should evaluate these strategies. The research efforts of Professor Harriott and other researchers in the Institute of Criminal Justice and Security and Justice, and the various departments of the Faculty of Social Sciences (a) extends the analysis of selected aspects of the crime problem (b) proposes solutions as policy and strategy that are grounded in our empirical understanding of the problem, and (c) evaluates some of the more promising responses and experiments at crime control by the police and other agencies.

ORGANIZED CRIME AND POLITICS - BREAKING THE NEXUS

In the book *Organized Crime and Politics - Breaking the Nexus* an attempt is made to analyse a particular expression of the nexus between politics and crime, that is, organized crime. It describes the rise of organized crime in Jamaica and its effort to consolidate its hold in the cities and towns. The analysis is extended by further exploring two critical aspects of the problem – political corruption and party financing. By focusing on the crime-politics nexus, the book shows how the crime problem has travelled from the margins into the mainstream of the polity and society. Institutionalized patterns of behaviour, including the methods of political mobilization and organization, and aspects of political culture are interrogated in an attempt to better understand why and how organized crime is facilitated.



By focusing on the crime-politics nexus, the book shows how the crime problem has travelled from the margins into the mainstream of the polity and society.



The Most Outstanding Researcher

Discussions of crime in Jamaica are generally considered to be almost useless if they are not solution-seeking. An attempt is therefore made to move the discussion beyond an analysis of the problems to possible approaches to solving and resolving them. It sketches some possibilities but restricts the discussion to the control of organized crime.

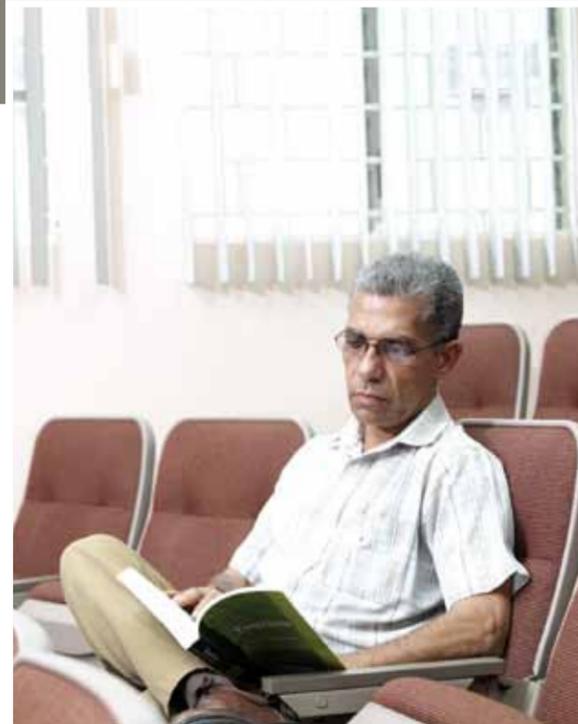
CRIME AND DEVELOPMENT – THE JAMAICAN EXPERIENCE

By defrauding the state criminal groups rob the country of resources for development. In the book *Crime and Development the Jamaica Experience*, which was coauthored by Prof. Alfred Francis, Dr. Godfrey Gibbison, and Mr. Claremont Kirton of the Department of Economics, the nature of the interaction between crime and economic growth and development is empirically investigated. This work estimates the economic cost of crime and maps the extent and nature of business victimization, that is, the direct impact of crime on firms. It also analyses the effect of specified factors (variables) on crime. These factors include the effects of economic growth, the opportunity cost of crime including the effects of unemployment and the level of secondary school enrolment, the level of inequality, and enforcement and punishment. Specifically, the study attempts to model a simultaneous system of equations consisting, inter alia, of supply functions for murder, rape and carnal abuse, shooting and robbery. This study is designed to advance our understanding of the sources of the crime problem and to strengthen the empirical foundations for the elaboration of policy.

It estimates that crime results in a substantial economic cost to the society. It reports an inverse relationship with GDP, and finds that inequality motivates violent crime and that effective law enforcement serves as a useful deterrent to crime. This study therefore argues that while economic growth is an important, perhaps even a necessary condition for effective control of the crime problem, it is not sufficient. A balanced approach to development that takes into account social factors, reducing inequality (especially inequality that is not derived from differential effort and performance) and improving educational achievement (not just enrolment), as well as ensuring effective and just law enforcement, is critical in ensuring a stable and safe society.

BENDING THE TREND LINE – THE CHALLENGE OF CONTROLLING VIOLENCE

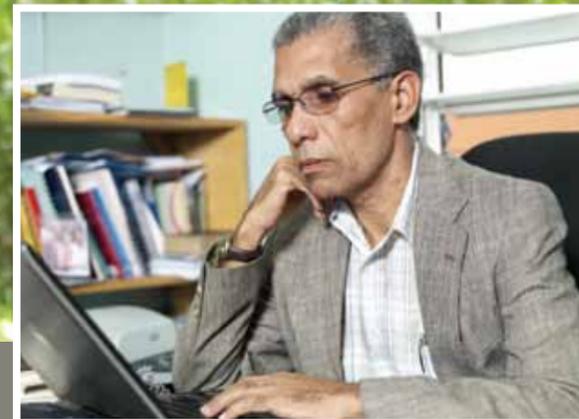
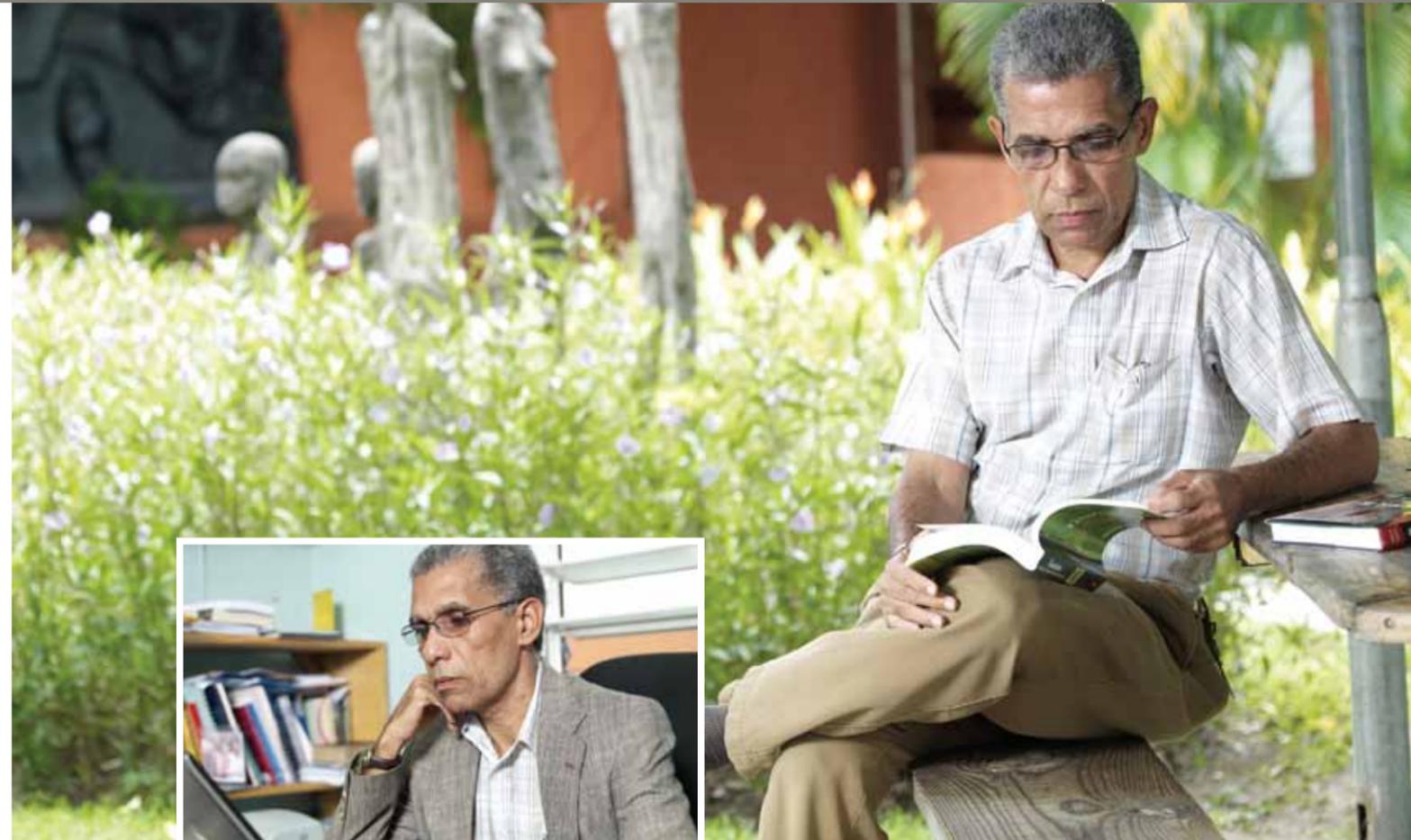
This monograph is an amplification of Dr. Harriott’s professional inaugural lecture and a preliminary report on a more comprehensive study of criminal violence in Jamaican society. In it he argues, first, that a subculture of violence has emerged in Jamaica and presents considerable evidential support for this in the behaviour patterns and attitudes of the population to the use of violence. Secondly, that we are still at a point in the formation of this subculture that permits a reversal of



this process. Thirdly, that aborting this process requires, among other things, a more robust law enforcement, that, must, however be based on fairness, respect for and service to the people; and not narrow criminal fighting.

The analysis develops by establishing the distinctiveness of the Jamaican crime pattern, that is, the predominance of violence and that the use of violence is not limited to habitual criminals and gunmen, but is more widely used by ordinary citizens as a means of dealing with everyday social conflicts. The indicators of the emergence of a subculture of violence are highlighted. These measures show that this behavior pattern finds considerable support in the attitude set and beliefs of a significant minority of the population. It follows from this that the control of violence is a much greater challenge than that of simply repressing predatory street criminality.

Following from the analysis, four scenarios of the possible directions that control of the problem may take are described. The first scenario is that the problem is controlled or the trend line bent by norms that are developed within the subculture of violence, that is, by self-regulation. A second scenario is based on the efforts of the state to control violence by increased repressive means. A third scenario, which is a variant of the second, compensates for the repressive incapacity or weakness of the state by developing a crime control partnership with the criminal “dons” in the high violence communities.



A fourth scenario is for a more democratic law enforcement coupled with social prevention measures that are consistent with our empirical understanding of the determinants of the homicide rate. Prof. Harriott suggests that there is still a window of opportunity to further advance this prospect. He draws on selected experiences at the community level to show the opportunities and possibilities.

THE BOOK - CONTROLLING VIOLENT CRIME

This book was written on the invitation of the Grace Kennedy Foundation for their annual lecture series. It is dedicated to exploring the crime control options of Jamaica and discusses these options as coherent strategies. The options that we have actually taken are presented and critically analysed. These include the Crime Control Model which targets the criminal event in an effort to remove offenders from the streets rather than the behaviour pattern. A second option is the Social Justice Model that emphasizes

the prevention of crime by socio-economic change. The third option that is presented is an Integrated Model that targets the problem in more precise ways. This would, for example, include a sharper focus on the high violence communities, pacifying them via both control and prevention measures. This model is essentially about better integrating prevention and control, and short-term and long-term measures.

Taken together, these publications are intended to further opens up the discussion on crime control policy. It is hoped that they will stimulate new ideas, and help policy-makers and decision-makers in the ministries, police force and other agencies to further clarify some of the issues and perhaps refine their policies and strategies.

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Political Culture of Democracy in Jamaica, 2008

HABITS OF THE HEART

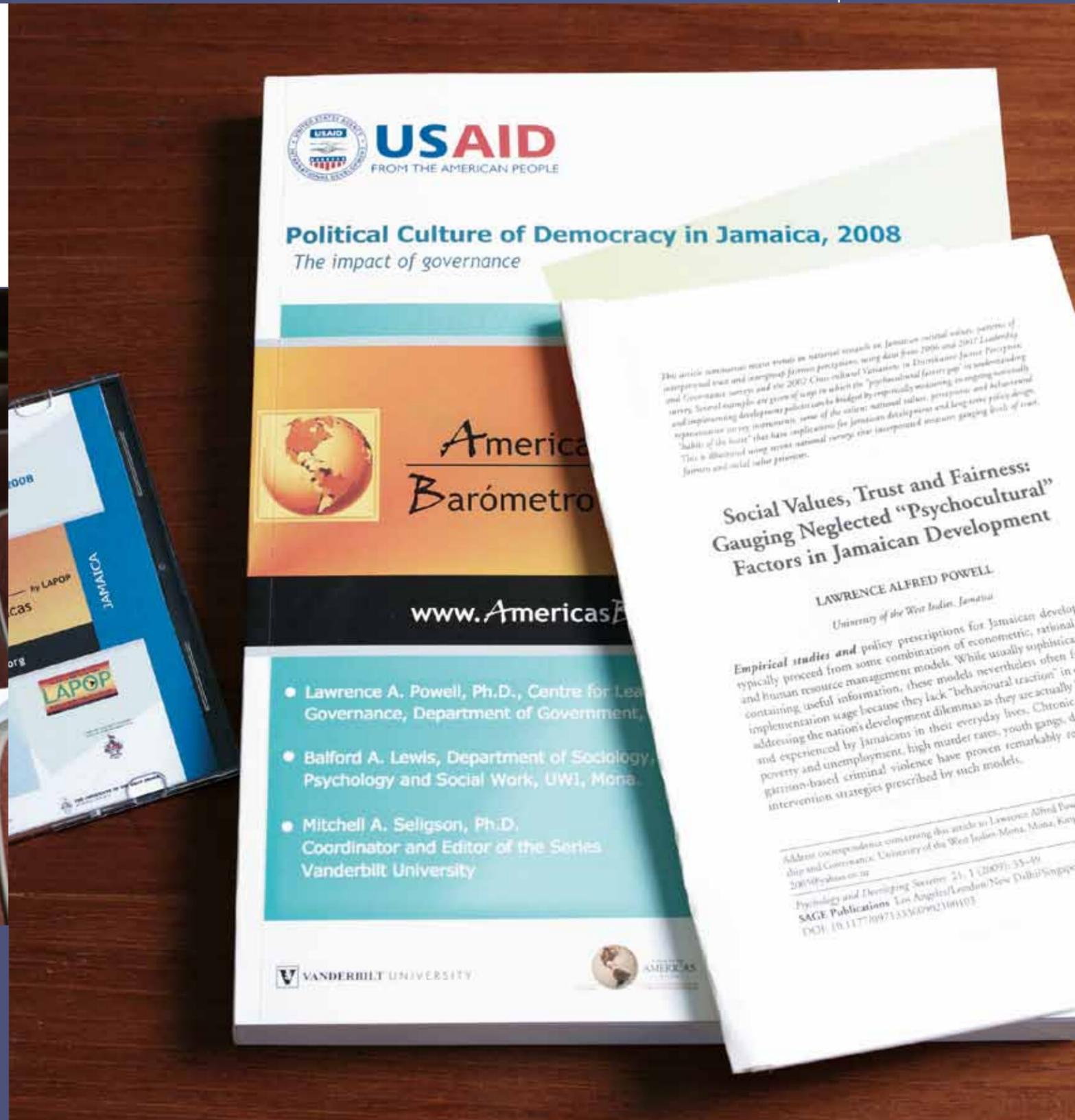
The culture of every nation is unique. A people's unique history and values, their 'habits of the heart,' provide the context within which politics and social life unfold. What we believe in and do not believe in as a society, what we consider just and unjust, moral and immoral, fair and unfair--defines what is possible for us. It defines which government policies we will find acceptable, and which ones we rebel against. It defines which politicians and parties we prefer, and do not prefer. As Carl Stone had pointed out, in order for Jamaicans to build a strong, stable democracy it is very important for the nation's social scientists to understand these shared "norms and values which determine, underpin and help to shape the character and essence of the economic and social structures."

The importance of these political 'habits of the heart' in maintaining a healthy democracy has often been overlooked by public and private sector policymakers. Understandably, they become preoccupied with shorter-term legal and financial aspects of governance. However in the longer term a healthy democracy, if it is to thrive over time, must be rooted in a widespread consensus on democratic values, which is shared across all major segments of the society. This shared consensus is often referred to in political science



Powell | Lewis

The importance of these political 'habits of the heart' in maintaining a healthy democracy has often been overlooked by public and private sector policymakers.



Political Culture of Democracy in Jamaica, 2008
The impact of governance



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This article summarizes major results on national surveys on Jamaican political values, patterns of interpersonal trust and integrity, citizen perceptions, survey data from 2006 and 2007 Leadership and Governance surveys and the 2002 Cross-cultural Variations in Distributive Justice Perception survey. Several examples are given of ways in which the "psychocultural factors gap" in understanding and implementing development policies can be bridged by especially measuring, recognizing and representing survey instruments, some of the nation's national values, perceptions and behavioural "habits of the heart" that have implications for Jamaican development and long-term policy design. This is illustrated using recent national surveys that incorporated measures gauging levels of trust, fairness and social value premises.

Social Values, Trust and Fairness: Gauging Neglected "Psychocultural" Factors in Jamaican Development

LAWRENCE ALFRED POWELL
University of the West Indies, Jamaica

Empirical studies and policy prescriptions for Jamaican development typically proceed from some combination of econometric, rational and human resource management models. While usually sophisticated and containing useful information, these models nevertheless often fail in implementation stage because they lack "behavioural traction" in addressing the nation's development dilemmas as they are actually lived and experienced by Jamaicans in their everyday lives. Chronic poverty and unemployment, high murder rates, youth gangs, and prison-based criminal violence have proven remarkable intervention strategies prescribed by such models.

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Psychology and Developing Systems, 21, 1 (2009), 33-44
SAGE Publications, Los Angeles/London/New Delhi/Singapore
DOI: 10.1177/09713336093400103

literatures as the 'political culture' of a nation--the set of democratic values, nurtured through a process of 'political socialization', by which individuals learn their political beliefs, behaviours, values and preferences, and by which these are passed from one generation to the next--through the family, educational and religious organizations, and the mass media.

MEASURING DEMOCRATIC VALUES

To what extent, then, do Jamaicans endorse the key values that underpin a well-functioning 'democratic culture', and which political scientists agree are necessary to sustain its health over time? Using a carefully-constructed national survey, researchers Lawrence Powell and Balford Lewis asked Jamaicans a variety of questions designed to gauge the strength of their democratic norms, as well as their preferences for democratic versus authoritarian rule. Findings of this survey are summarized in their report, Political Culture of Democracy 2008: The Impact of Governance.

SUPPORT FOR DEMOCRACY

The overall pattern that emerges from this Jamaican survey shows that there is relatively strong popular commitment to basic norms of democracy and the related ideals of equality, freedom, tolerance and social justice--when compared with 22 other Latin American and Caribbean countries. On a variety of possible measures of democracy, Jamaicans ranked within the upper third among the nations surveyed in the LAPOP study. Jamaicans ranked 8th among the 23 countries in their belief that democracy "is better than any other form of government," 4th in their belief in the legitimacy of the

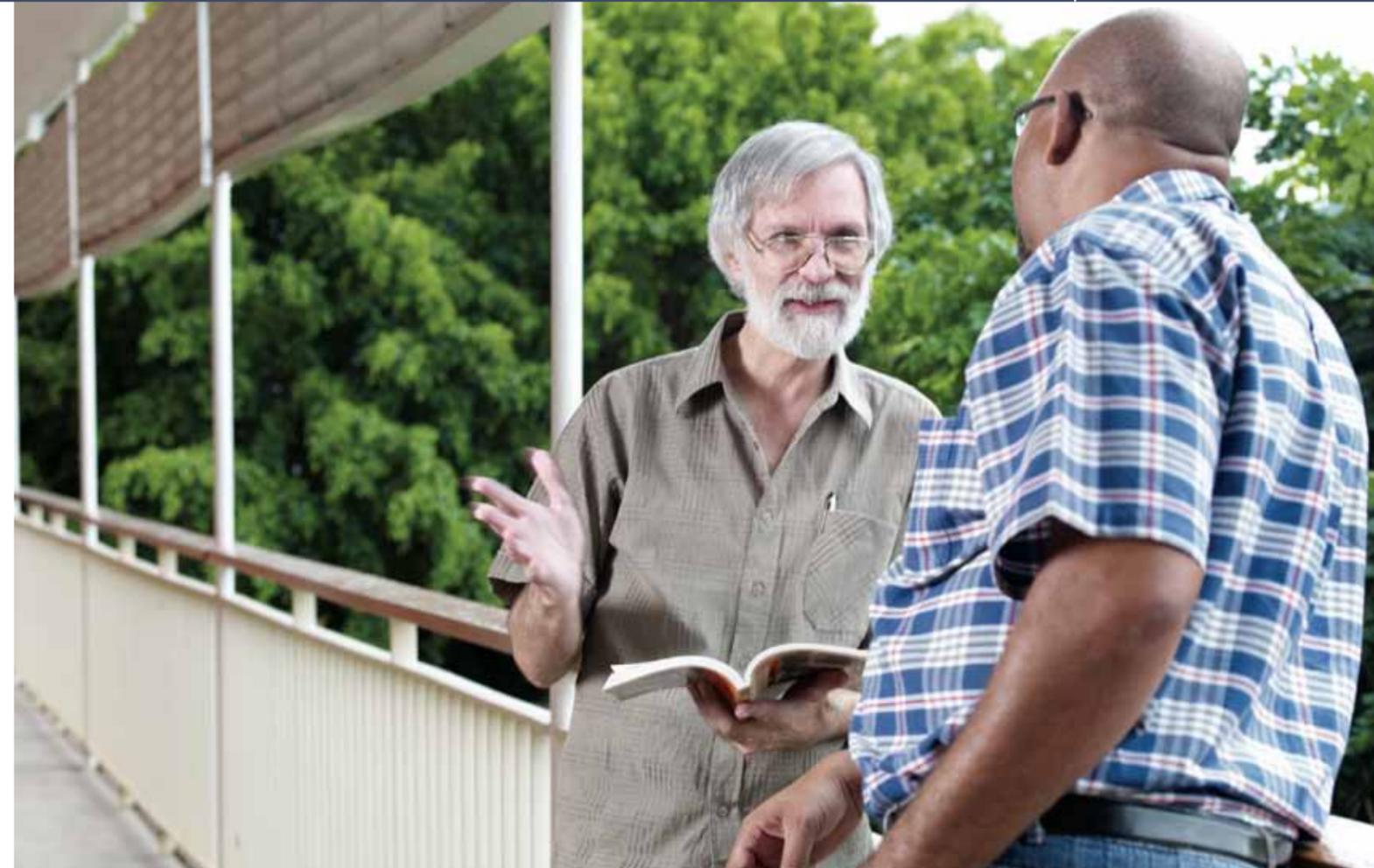
country's core political institutions (national government, justice system, political parties), 6th in tolerance for minority and opposition rights, and 9th in support for the right of public contestation.

POLICE-CITIZEN RELATIONS

The survey also probed relations between law enforcement authorities and the citizens they serve. Findings indicate that, contrary to impressions common in sensationalistic media reports, most Jamaicans feel that when police come into their neighbourhood they are "there to help" rather than "there to abuse," and 3 out of 4 Jamaicans feel the interests of the police and the people in their neighbourhood are "in common" rather than "opposed." About two-thirds also say they would be willing to cooperate in "working closely" with police to fight crime in a joint police-citizen programme, with only a third saying they would "hesitate" to do this.

CORRUPTION AND DISTRUST

Findings on perceived corruption within the political system were less encouraging, however. 96% of the Jamaican respondents described corruption among public officials as either "common" or "very common"- the highest score across all 23 LAPOP nations. Citizen reports of actual corruption were somewhat lower, with about 25% reporting personal experience of corrupt acts or proposals. Findings on the low degree of interpersonal trust within Jamaican society were also worrisome--with about 84% saying that



other persons in Jamaica cannot be trusted, and there were similarly high levels of distrust in Jamaican government officials.

NEED FOR NATIONAL POLICIES FOCUSED ON SOCIAL INTEGRATION

The research should be of value to public and private sector policymakers in Jamaica, as the analysis helps to identify policies that are most likely to be favoured by the electorate, as opposed to strategies that may result in alienation or resistance by citizens. To assume that such culturally-rooted 'habits of the heart' are unimportant, or unmeasurable, runs the risk of generating national policies that will be socially and culturally ineffective. In particular, given the distrust and corruption perception findings, the research affirms the need for government to

focus more heavily on trust-building community integration strategies, in order to build social capital and address chronic issues of violent crime, poverty and unemployment.

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National Mathematics Programme: Monitoring and Evaluation Project

Mathematics Education is a very important part of learning. This is because education in mathematics allows students to develop their skills with the use of numbers, which will help them function better in the difficult world we live in today.

MATHEMATICAL SKILLS ESSENTIAL

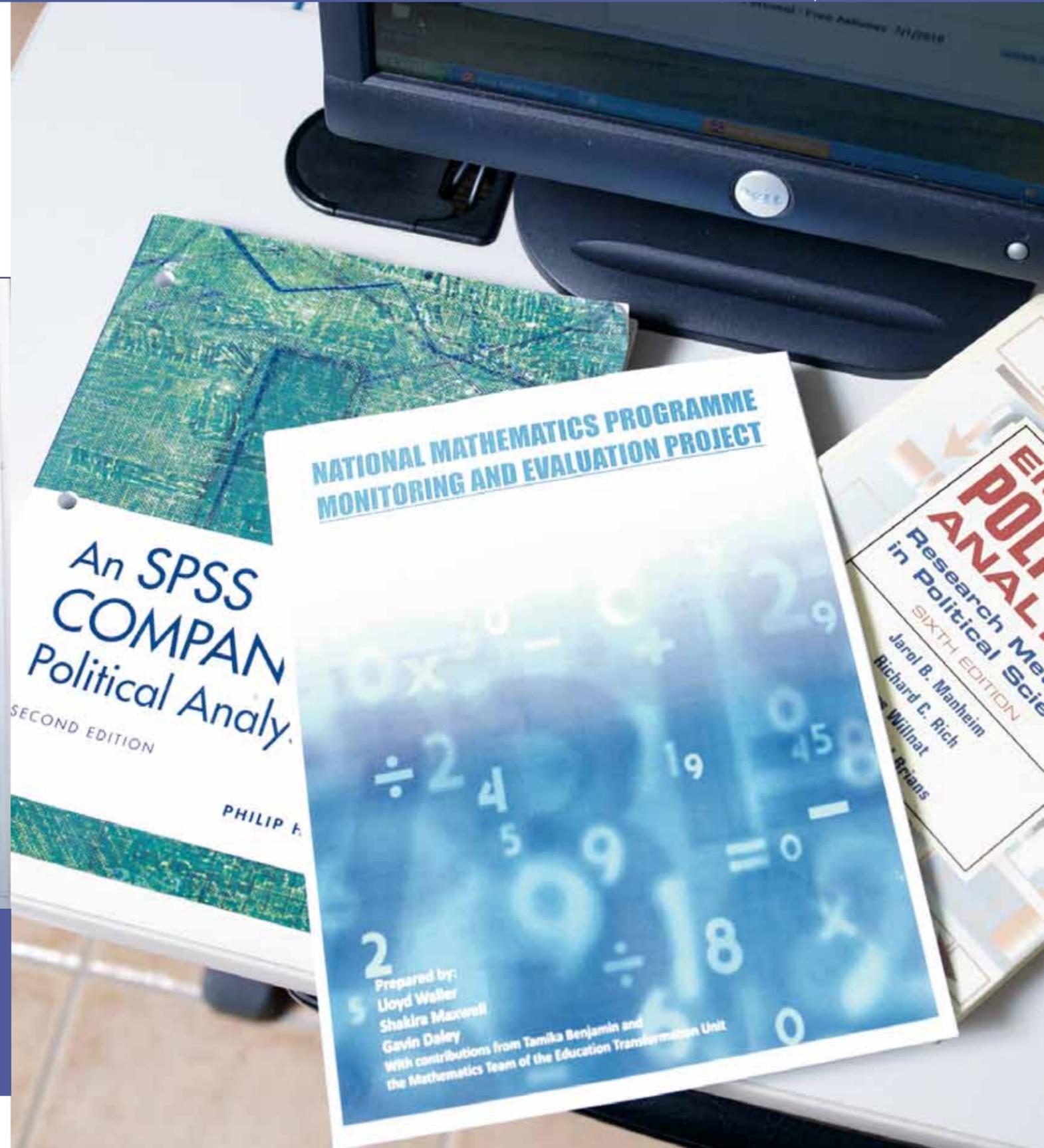
Having good skills in mathematics has been defined in many different ways. For instance, math provides the knowledge, skills and understanding a student needs to be able to use and appreciate mathematical ideas and methods. The Draft National Numeracy Policy of Jamaica (2003) states that a person with good mathematical skills has the ability to use a range of mathematical processes confidently, in order to solve problems in everyday life.

This means that having good skills in mathematics is more than simply knowing about number facts and processes and being able to perform calculations. The most important thing is for persons to be able to use their knowledge and ideas of math successfully in their everyday lives and experiences. It is clear therefore that not having good math skills would be a concern to educators and other members of society, for individuals lacking these skills would find it difficult to function in simple settings, to read and understand information presented in a mathematical form and to perform simple calculations. A person without a good understanding of math would have great difficulty reasoning and working within today's increasingly globalized and technological setting.



Waller | Maxwell | Daley

The most important thing is for persons to be able to use their knowledge and ideas of math successfully in their everyday lives and experiences.





This project is significant. The data collected will help members of the mathematics team in the ministry to assess and determine whether the plan, geared at improving students' achievements in the subject, has been correctly designed.

DECREASE IN DEMAND FOR SEMI-SKILLED AND UNSKILLED

The world's need for unskilled and semi skilled labour has decreased. This change in the job market has meant that there is now a greater demand on young workers and on those leaving school: mathematical skills are essential for persons entering the workforce. Gone are the days when basic arithmetic was the minimal requirement. The reality of today's world has placed greater demands on the education system to produce individuals who can function effectively in the changing workplace.

MINISTRY FOCUSES ON MATHEMATICS

As the focus of the Ministry of Education in Jamaica has turned to mathematics education and the issues impacting the development of math competence, this project has made significant contributions. Firstly, baseline data were collected to measure/assess the main factors which have a significant impact on the teaching and learning of mathematics. Secondly, while data relating to teacher qualification were collected and examined through the Ministry of Education's Census, significant holes were found in the data relating to teacher attitudes and beliefs about mathematics education. But this information has never officially been put together within the Jamaican context. As a result, most of the assumptions about poor performance of students in mathematics in Jamaica are just guesses. There is little qualitative or quantitative evidence to verify the claims – which are often centred on the quality of the teacher and his/her knowledge and attitude to the subject, the social issues affecting students and issues relating to the quality of the school, class size and lack of resources.

PROJECT VALUABLE TO THE MINISTRY OF EDUCATION

This project is significant. The data collected will help members of the mathematics team in the ministry to assess and determine whether the plan, geared at improving students' achievements in the subject, has been correctly designed. A key strategy employed was the intervention programme, which saw the deployment of 58 specialists to 244 schools in October 2008. Teachers in these schools will benefit from the support of the specialists through school visits and workshops, model lessons and assistance with planning.

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