



New Initiatives

Two-component Signal Transduction Proteins in Cyanobacteria, Bacteria and Archaea

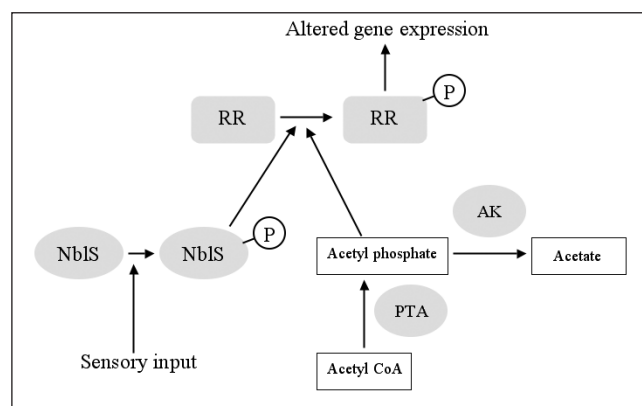
Principal Researcher: Dr. Mark Ashby
Department of Basic Medical Sciences

Research Assistants: Mrs. Shirley Budall
Ms. Nataala Burnett
Mr. Seian Morrison

The research project sought to elucidate the function of putative two-component proteins which have been identified by genome sequencing of cyanobacteria. Cyanobacteria are photosynthetic bacteria that are present in very significant numbers in virtually every habitat. They make use of the two-component proteins to sense changes in their environment and respond appropriately to these changes. Many two-component genes have been identified by genome sequencing. Work has been carried out to determine the function of some of these using molecular biology and biochemistry. Comparative genomics has also been used to analyse the detailed structure of the proteins and their distribution in cyanobacteria, archaea and prokaryotes in general. This has given clues as to the evolution of these proteins and their relevance to the different physiologies of various organisms and the habitats in which they are found.

This research has led to the publication of many journal articles, including:

- *Survey of the Number of Two-Component Response Regulator Genes in the Complete and Annotated Genome Sequences of Prokaryotes.* Mark K. Ashby. *FEMS Microbiol. Lett.* **231**, 277-281 (2004).
- *The ycf27 Genes from Cyanobacteria and Eukaryotic Algae: Distribution and Implications for Chloroplast Evolution.* Mark K. Ashby, Jean Houmard and Conrad W. Mullineaux. *FEMS Microbiol. Lett.* **214**, 25-30 (2002).



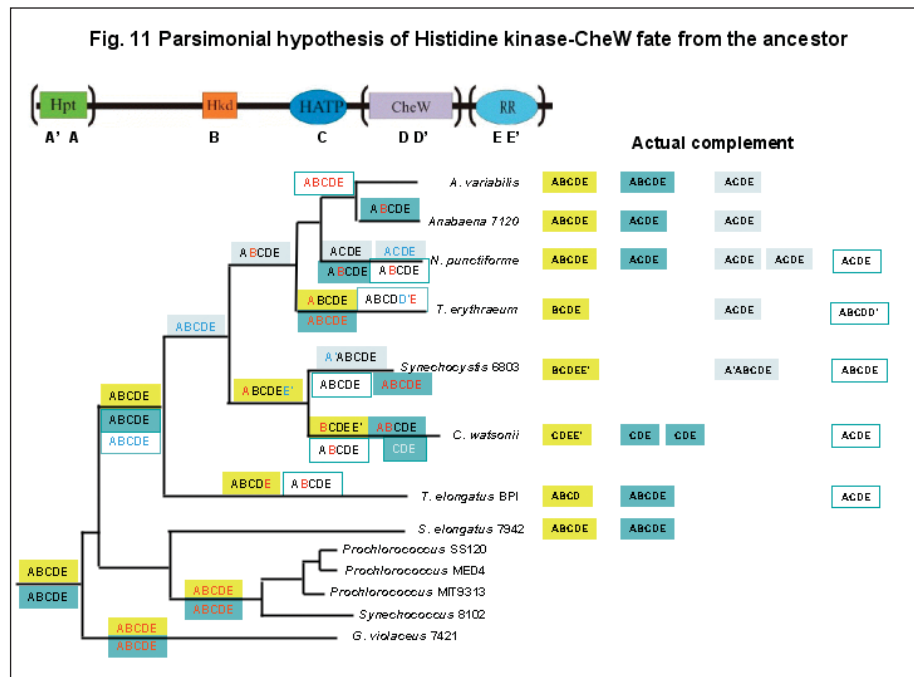
Parsimonious hypothesis of Histidine kinase-CheW fate from the ancestor



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The preparation of the following articles is presently underway:

- *The Influence of Acetyl Phosphate on DspA Signalling in the Cyanobacterium Synechocystis sp. PCC 6803.* S. Shawn Morrison, Conrad W. Mullineaux and Mark K. Ashby.
- *Structure, Diversity, Distribution and Evolution of Cyanobacterial Two-Component Proteins.* Mark K. Ashby and Jean Houmard.
- *Distribution, Structure, Diversity and Evolution of 'Bacterial' Two-Component proteins in the Euryarchaeota.* Mark K. Ashby.



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Antibiotic Resistance in Strains of Neisseria Gonorrhoea Encountered in Jamaica

Principal Investigator: Dr. Nabin C. Bodonaik
Department of Microbiology

Research Assistant: Ms. Lois Rainford

Gonorrhoea is a common sexually transmitted infection and a major public health problem in Jamaica and the wider Caribbean. Antibiotic resistance in gonorrhoea bacteria (gonococci) has changed dramatically over the past 60 years of the antibiotic era and varies widely in different parts of the world. Hence, it is necessary to study the types of gonorrhoea and the gonococci which cause infection locally to ascertain the best treatment regimen that could be used in patients in Jamaica.

The purpose of this ongoing research project is to study the bacteria recovered from patients at the University Hospital of the West Indies over the past 20 years. The focus of the study at this stage has been on data collected for the seven year period, 1997-2003.

A total of 370 patients with gonorrhoea were seen in the hospital during the seven year period. Of these, 347 (93.8%) had genital infections. There were 17 (4.6%) gonococcal eye infections (mostly in neonatal babies), 4 (1%) joint infections, 1 (0.3%) gonococcal blood infection and 1 (0.3%) had rectal gonorrhoea. The vast majority of patients were between the ages of 18 and 39. Notably, there were 22 children with gonorrhoea (with genital infection) amongst the 370 patients and accounted for 6% of the total number of cases. This incidence is very high compared with similar cases in various hospitals in the United States of America and the United Kingdom.

The most effective antibiotic was ceftriaxone (100%) followed by ciprofloxacin (99.7%) and erythromycin (90.1%). The older antibiotics such as penicillin and bactrim were less effective (76.3% and 65% respectively).

The information generated from the study would be useful to public health care professionals particularly those involved in the management and control of gonococcal infections in the Jamaican environment. The high incidence of paediatric cases of gonorrhoea could be taken as a reflection of the high prevalence of sexual abuse of children in the community.

The study's findings were presented in 2 scientific papers, which were presented at the 41st Annual Conference of Infectious Diseases Society of America (IDSA) held in San Diego, California, 2003 (Abst. 925, p. 194) and the 11th International Congress on Infectious Diseases (ICID) held in Cancun, Mexico in March 2004. (Intern. J. Infect. Dis. 8 (Suppl. 1; P S65).



New Initiatives

Modelling Groundwater Flow in the Alluvial Aquifer of the Lower Yallahs Basin, Eastern Jamaica

Principal Researcher: Dr. Faisal A. Butt
Department of Geography and Geology

The Yallahs River Watershed Management Unit, drained by the Yallahs River, is the westernmost watershed management unit (WMU) in the Blue Mountain South Basin. With a total area of about 200 km², the WMU is among the smaller ones in Jamaica. Since the mid-1980s a pipeline installed on the Yallahs River at Ramble has been diverting water to Kingston to meet the requirements of Kingston and its environs. River flow data since 1997 show that the diversion from the river to the pipeline varies between 0 to about 360,000 m³/day with an average of about 60,000 m³/day. The diversion may constitute anywhere between 0 to 100% of the total river discharge.

The diversion has led to the conversion of the Yallahs River from a perennial to a seasonal river and has seriously affected water availability for downstream users in the area. Irrigation has been especially affected since it relied entirely on surface water. In addition, it has increased reliance on groundwater in the alluvial aquifer of the lower Yallahs River basin. The aquifer is coastal in nature and there is a concern that overpumping from the aquifer may lead to seawater intrusion. There is therefore a need to establish a safe yield for the aquifer (the amount that may be withdrawn from the aquifer annually without permanently depleting it). A critical parameter in this regard is determining the amount of natural groundwater discharge required to maintain the natural position of the freshwater-seawater interface.

In the case of the Yallahs aquifer, two different estimates of required submarine discharge have been made. The Water Resources Master Plan prepared by the Government of Jamaica (Underground Water Authority, 1990) estimated the required discharge at 3744 m³/day whereas Baptiste (1996) provides a value almost three times as large (12,965 m³/day). Both studies used different approaches and different values of aquifer parameters such as aquifer thickness and hydraulic conductivity. Estimates used by the two studies are different by orders of magnitude. Which of the two values is considered to be correct has serious implications for water users and managers in the area, since the difference amounts to over three million cubic metres of water annually or almost 200 m³ per capita per annum for the population in the parish of St. Thomas.

Lack of sufficient field data has been the main hurdle in making more accurate estimates of the safe yield from the basin. As part of the work of this ongoing research project, groundwater flow in the alluvial aquifer of the Lower Yallahs River Basin has been numerically simulated to provide estimates for key aquifer parameters and to make a water budget for the aquifer. The software being used for the purpose is Visual MODFLOW Pro, which is an industry-standard in the field of groundwater modelling.



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In order to validate model simulations with field data, geophysical investigations were carried out during the summer of 2004 by the principal investigator and Dr. Nils-Otto Kitteroed from the Department of Geosciences, University of Oslo. Staff from the Water Resources Authority, (WRA) assisted in the investigations. The fieldwork was facilitated by a research grant to Dr. Kitteroed from University of Oslo (UiO). This included the use of a Georadar owned by UiO. The next step is to get the data processed, in all likelihood at the University of Cambridge, by the end of 2004 so that the results of numerical simulations can be compared with field data. Finally, output from Visual MODFLOW Pro will be used to study the freshwater-seawater interface using a software programme called SEAWAT.

On completion, it is hoped that this research project will not only provide better estimates of the various hydrologic parameters but also assist in the better management of the aquifer's resources.



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New Initiatives

Financing Agriculture in Jamaica: An Assessment

Principal Researcher

Dr. Wayne Henry
Department of Economics

Historically, agriculture has been a fundamental aspect of the Jamaican economy. The sector currently accounts for some 21 percent of the employed labour force and approximately the same percentage of the total value of Jamaican exports. Yet, as with many developing countries, agricultural credit has declined over the years. Total loan funds provided by the Jamaican government through the financial intermediaries declined by 36.7 percent in 1998 and a further 21.8 percent in 1999. The Jamaican agricultural finance situation has been exacerbated by the financial crisis in the banking sector in the 1990s. As commercial banks grew more cautious in lending, agricultural credit through commercial banks declined by 22 percent in 1998 and again by 22 percent in 1999.

In an environment of increasing globalization and increased liberalization, questions arise as to the extent to which issues of agricultural finance contribute to the overall performance of the sector. This study sets out to:

- assess how much the Jamaican agricultural sector gets in financing and the sources of this financing;
- identify the forms of financing to the sector;
- examine the trends in agricultural financing over the past two decades (1980 – 1999);
- observe the relative share of financing of each industry within the agricultural sector;
- assess the current challenges, if any, to financing agriculture in Jamaica, and
- make specific recommendations based on the findings.

Research findings to date have provided an overview of the agricultural sector in Jamaica, comparing it with other countries, particularly in the Caribbean. Work was carried out to identify the most common agricultural products in the Caribbean and in particular, Jamaica. There was also an examination of the contribution of agriculture to economic growth throughout the Caribbean as well as in the G-5 countries. Traditional government policies were also examined.

Interviews were held with agricultural lenders and revealed a common problem among loan applicants of a lack of collateral. As a result, they were unable to secure the loans, which created other problems such as high risk and insufficient funding. The study also identified the problems emanating from the lack of planning and preparation for adverse business conditions (e.g. bad weather, crop failure) by borrowers. Interviews will also be held with loan recipients throughout the various agricultural industries.

The study should provide useful information for policymakers, practitioners and researchers. Furthermore, the research findings should not only facilitate comparisons with other economies throughout the world but also help to inform discussions on the efficient financing of agriculture in Jamaica.



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New Initiatives

A Ten-Year Outcome Study of Schizophrenia in Jamaica

Research Co-ordinator: Professor Frederick W. Hickling
Department of Community Health and Psychiatry

Research Fellow: Ms. Tamika Haynes

The aim of this completed research project was to carry out a prospective comparison of a cohort of persons diagnosed with schizophrenia ten years from initial contact with the mental health care system in Jamaica. This entailed a ten-year follow-up study where a cohort of 317 patients identified in 1992 with a CATEGO± diagnosis of Schizophrenia aged 15-55 was traced and those found were reassessed. The main outcome measures collected from case notes and patient interviews included clinical status and medication usage at contact with clinical service, employment status, outpatient clinic compliance and relapse rate. The Positive and Negative Syndrome Scale and the Present Status Examination were used to rate the presence and severity of psychotic symptoms.

Of the 317 patients in the cohort, 216 were traced and of those traced, 183 were interviewed and assessed. It was found that 117 (64.2%) were males and 58 (31.8%) were females. The results also showed that 82 (45%) were employed and 69 (37.6%) were unemployed. The rate of relapse in the located cohort was 39.7% ($\chi^2=8.3111$, $df= 1$; $p=. 004$). The PANSS showed 43% of patients who had relapsed were exhibiting composite scores of both positive and negative symptoms in the 50th percentile (ANOVA=32.013, $df = 7$; $F= 3.447$; $Sig. = 0.000$). Drug use and abuse in the cohort showed that 102 (59%) patients were not using any drugs, 12 (6.9%) used alcohol, 69 (37.7%) used Cannabis with 20 (11.6%) patients acknowledging addiction to a substance.

The study's findings indicated that the relapse rate is equal to the worldwide relapse rate for first contact with schizophrenia. The relapse rate found is also consistent with the relapse rate after ten years in developing countries. The relapse rate of schizophrenia in Jamaica after ten years is lower than that of Afro-Caribbean persons with schizophrenia in Britain.

This study has provided the first comprehensive database on the longitudinal course and prognosis of schizophrenia in Jamaica as well as in the Caribbean. As the first assessment of schizophrenia over ten years in the Caribbean, it serves as an intrinsic guideline for the treatment of this disorder relevant to the cultural and social norms of both the Jamaican and Caribbean societies. Lending itself to even a wider application, the study can be considered to be an evaluation of the mental health service in Jamaica. In this regard, it should provide policy makers and health care professionals with an essential instrument necessary in affecting positive changes and improving the standard of care for mentally ill persons in Jamaica.



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New Initiatives

The Effect of S-nitrosothiols on Blood Glucose Metabolism and Studies on Haemodynamic Parameters

Principal Researcher: Dr. Ruby Lindo
Department of Chemistry

S-nitrosothiols (RSNOs) and nitric oxide (NO) have similar physiological roles *in vivo*. These include smooth muscle relaxation, the prevention of platelet aggregation and immunoregulation. Over the past decade research has been geared towards the synthesis of new RSNOs in recognition of the therapeutic value of these drugs. One such nitrosothiol is s-nitrosocaptopril, which is considered a potential drug for treating high blood pressure. This drug is a derivative of captopril, which is a known angiotensin converting enzyme (ACE) inhibitor that is used to treat individuals with high blood pressure. RSNOs are also used in the treatment of hypertension (high blood pressure), as patients treated with these drugs do not develop nitrate tolerance as observed with patients who are treated with organic nitrates.

Because of the close link between abnormal glucose metabolism and hypertension, this completed research project sought to investigate the effects of s-nitros-N-acetyl-D,L-penicillamine (SNAP), s-nitrosocaptopril (capSNO) and captopril on blood glucose metabolism and their acute effects on heart rate, systolic blood pressure, diastolic blood pressure and mean arterial blood pressure, in normal healthy rats. It was found that Captopril showed no effect on blood glucose concentration; however CapSNO and SNAP showed a dose-dependent increase in blood glucose concentration via either intravenous or oral administration.

Additionally, it was found that there was also a significant increase in blood glucose concentration when co-administration of the RSNOs with ascorbic acid (vitamin C) and cysteine (a non-essential amino acid) was done. The increase was not significant when they were co-administered with glutathione. Captopril, SNAP and CapSNO were efficient in causing a reduction in the blood pressure in normal rats, with SNAP and CapSNO being more effective than captopril. According to these findings, SNAP and CapSNO administered alone or in combination with reducing agents such as ascorbic acid and cysteine are not ideal for treating Diabetics suffering from hypertension.

These research findings have been documented in the following conference papers:

- *The Effect of S-nitrosocaptopril on Blood Glucose Metabolism and Studies on Haemodynamic Parameters* for the 6th Biennial Pure and Applied Sciences Conference, March 18-20, 2003, and
- *The Effect of S-nitrosocaptopril on Blood Glucose Levels and Haemodynamic Parameters* for the 18th International Diabetes Federation Congress, August 24-29, 2003.



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New Initiatives

An Epidemiological Study of Psychoeducational Disorders in Jamaican Children

Principal Researcher: Professor Scott W. Minor
Department of Sociology, Psychology and Social Work

The purpose of this two-year research initiative is to collect baseline and normative data for an epidemiological study of psycho-educational disorders in second and third grade children and also to investigate the impact of educational and social variables on cognitive functioning and academic achievement.

The first year of the study has been completed with the collection of data from 71-second grade students. The students were randomly selected from eight schools in Kingston and St. Andrew. Of those students, 40 were enrolled in primary schools and 31 were enrolled in preparatory schools. Cognitive functioning was assessed by the Vocabulary, Comprehension, Block Design and Picture Concepts Subtests of the WISC-IV and academic achievement was assessed by the Reading and Arithmetic Subtest of the WRAT-3. In addition, educational history and socioeconomic data were obtained from the parents.

In general, educational history such as the type of early childhood institution and school type and socioeconomic status were valid predictors of cognitive functioning and academic achievement. In all comparisons, students attending preparatory schools performed better than students attending primary schools. Also, students whose parents had higher socioeconomic status, performed better than students whose parents had lower socioeconomic status. Further, students who attended preschool/kinder-garten performed better than those students who did not. The performance on the cognitive and academic achievement measures for students enrolled in preparatory schools was very consistent with normative data from the United States, but the scores for the Public school students was substantially below the normative data for samples in the United States. Lastly, there were no gender differences found on any of the cognitive or academic achievement data. In general, the preliminary results of this project are consistent with the previous research that has been done in Jamaica (see Samms-Vaughn, 2000, in press) in suggesting that the inequality in the early childhood educational experience for Jamaican children is related to measures of cognitive functioning and academic achievement.

In the second year of this project, it is hoped that data will be collected on 100 additional students, which will allow for an investigation of group differences and stronger inferences from the data. Further, the addition of these participants will enable a comparison of the various grouping of students in relation to the data collected for three child behavior rating scales.



New Initiatives

Molecular Investigations of Recombination between Crop-and Weed-infecting Geminiviruses from Jamaica

Principal Investigator: Dr. Marcia E. Roye
Biotechnology Centre

In the summer of 1994, farmers in St. Ann complained of whitefly infestation on their cabbage plants. The cabbage plants exhibited symptoms of chlorosis, leaf curling and other leaf deformation symptoms. These symptoms were often associated with an increase in the whitefly (*B. tabaci*) population. This disease causes the leaves of the cabbage to curl outwards distorting the cabbage 'head,' which makes the infected vegetable unmarketable (Figure 1). This cabbage disease had devastated many smallholding farms in Jamaica where cabbage production was already low owing to a prolonged drought. Between the years 1993 and 1995, the already low cabbage production decreased by 18% which resulted in a subsequent dramatic increase (900%) in imported cabbage (Allen 1998).

This ongoing research project seeks to characterize and distribute the geminiviruses associated with the cabbage leaf curl disease (CLD) in Jamaica and determine the relationship with geminiviruses which infect weeds in Jamaica. Results of the research indicated that there are at least two different viruses associated with CLD in Jamaica. These include the cabbage leaf curl virus (CaLCuV) and the cabbage leaf curl Jamaican virus (CaLCuJV). The latter is a recombinant virus between (CaLCuV) and macroptilium golden mosaic virus from Jamaica (MacGMV-JM1) which infect a leguminous weed. Both CaLCuV and CaLCuJV are widely distributed in cabbage and cauliflower cultivars in Jamaica. Further analysis suggests that CaLCuV is closely related to another virus that infects the common weed *Rhynchosia minima*. A second geminivirus infecting the weed *macroptilium lathyroides* was shown to infect red peas.



Plant infected with the Cabbage Leaf Curl virus



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Cabbage field

The research findings will help to elucidate the importance of virus recombination in the evolution of geminiviruses, especially in areas such as Latin America and the Caribbean Basin where mixed infections are common. Molecular characterization of the geminiviruses infecting common weeds in Jamaica will establish their importance in the Jamaican agricultural system. Evaluating recombination among geminiviruses may also lead to the development of new control strategies for whitefly-transmitted geminiviruses.

Several cabbage cultivars have been identified as being resistant to CaLCuV and therefore have been recommended for planting in Jamaica. The interaction of these cultivars to CaLCuV is also being investigated. The close relationship between crop- and weed-infecting geminiviruses in Jamaica and the indication that some weed geminivirus can infect eco-

nomically important crops suggest that the control of weeds and the geminiviruses they harbour should be considered as a critical part of any integrated pest management programme to control the geminiviruses which continue to devastate vegetable production in Jamaica.

Several publications and conference presentations have been generated by this work some of which are listed:

- M.E., Roye, Brown, S., Spence, J.D., Smith, K., McLaughlin, W.A., Brown, J.K. and Maxwell, D.P. 2003. *Ten years of molecular biology research on whitefly-transmitted geminiviruses from Jamaica: A review.* Jamaican Journal of Science and Technology 14:98-118.
- Roye, M.E., McLaughlin, W.A., Maxwell, D.P. 2000. *The evolution of new virus genes: Interspecies recombination among two geminiviruses from Jamaica.* Jamaican Journal of Science and Technology 11:42-46.
- Roye, M.E., McLaughlin, W.A., Spence, J.D. and Maxwell, D.P. 1999. *The common weed *Macroptilium lathyroides* is not a source of crop-infecting geminiviruses from Jamaica.* Tropical Agriculture 76:256-262.
- Amarakoon, I.I., Roye, M.E., Briddon, R. and Stanley, J. 2003. *Molecular characterization of weed-infecting geminiviruses from Jamaica, their relationship to some crop geminiviruses and implications for virus control.* Scientific Research Council Seventeenth Annual National Conference on Science and Technology. Knutsford Court Hotel, New Kingston Jamaica.pg 31.



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- Lawrence, T.G., Roye, M.E., McLaughlin, W.A. 2003. *Potential of Pseudomonas putida NCIMB-9751 and Bacillus sp. UWI-3 to promote growth and control of potyvirus disease in Capsicum chinense (Jacq.) scotch bonnet pepper.* Scientific Research Council Seventeenth Annual National Conference on Science and Technology. Knutsford Court Hotel, New Kingston Jamaica.pg 27.
- Roye, M. E., Smith K.N., Haye, I.I, McLaughlin, W.A, Maxwell, D. P. 2003 *Cabbage leaf curl disease in Jamaica includes a mixed infection with a recombinant geminivirus.* American Phytopathological Society Annual Meeting, Charlotte, North Carolina Pg S75.



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Local Government Reforms in Jamaica (1993-2000): An Evaluation

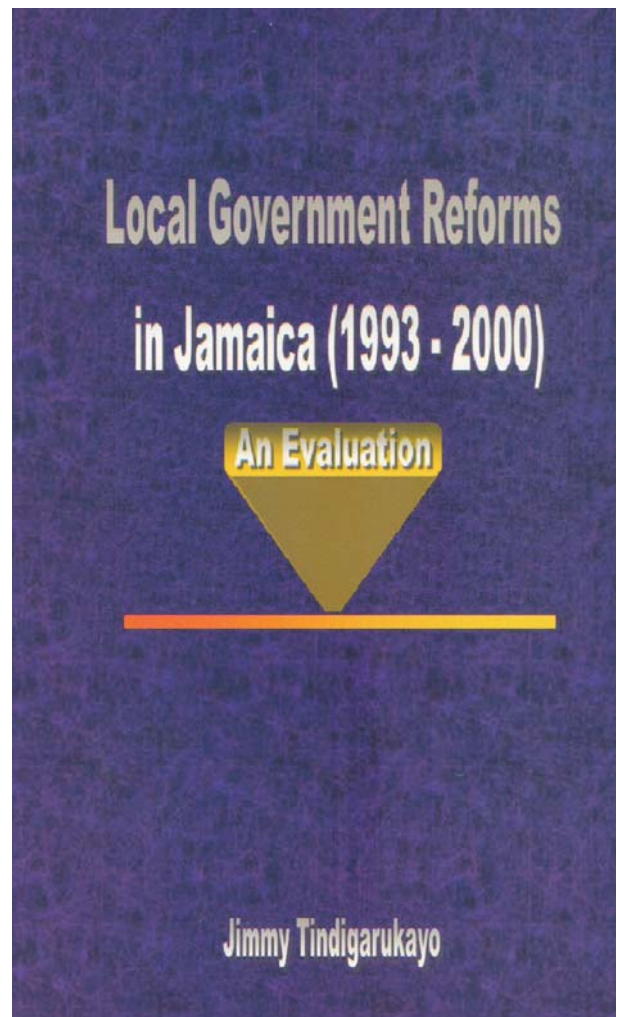
Principal Researcher: Dr. Jimmy Kazaara Tindigarukayo
Sir Arthur Lewis Institute of Social and Economic Studies

In 1993, the Government of Jamaica tabled the Ministry Paper No. 8/93 outlining the Local Government Reform Programme (LGRP), which sought to attain the following objectives:

- deepen and broaden the democratic process;
- create a framework through which citizens, local interests, Non-Governmental Organizations, the private sector and voluntary organizations can be directly involved in the management of local affairs;
- ensure that local services and regulatory functions are of high quality and are carried out in a cost effective manner; and
- attain a more efficient and cost-effective division of labour between the branches of central and local government.

The LGRP sought to achieve these objectives by carrying out financial and legal reforms, institutional upgrading, upgrading of the quality of services, infrastructure management and public education/participation. A study was carried out to evaluate these reforms through the critical examination of documents relating to them since 1993, and through the analysis of data arising from a social survey conducted among local government officials and members of civil society across Jamaica in the year 2000.

The main findings of the study were four-fold. First, despite their implementation in the way envisioned in the Ministry Paper 8/93, the reforms have been painfully slow. Secondly, notwithstanding the establishment of the Parochial Revenue Fund in 1996, as a new arrangement for financing local government, local government authorities in Jamaica still lack financial independence. Thirdly, parish





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councils have failed to integrate members of civil society into local government activities. Finally, the failure to entrench local government authorities into the Jamaican Constitution has undermined the local government reforms in Jamaica.

The findings from the study were presented in a book *Local Government Reforms in Jamaica (1993-2000): An Evaluation* published by the Sir Arthur Lewis Institute Publications, December 2003 (ISBN 976 40 0060 6). The book also contained recommendations for improving the chances of success for local government reforms in Jamaica. The published work should be beneficial to both academics and policy makers who are interested in local governance and the reform process associated with it, within the context of the Jamaican state and society.

Local Government Reforms in Jamaica (1993 - 2000) An Evaluation

Jimmy Tindigarukayo

This study is based on a critical examination of documents relating to local government reforms in Jamaica since 1993 and on the results of a social survey conducted among local government officials and members of civil society across Jamaica in the year 2000. The study suggests, first, that despite their being implemented in the way envisioned in Ministry Paper 8/93, the reforms have been painfully slow; second, that notwithstanding the establishment of the Parochial Revenue Fund in 1996 as a new arrangement for financing local government, local government authorities in Jamaica still lack financial independence; third, that parish councils have failed to integrate members of civil society into local government activities; and finally, that the failure to entrench local government authorities into the Jamaican constitution has undermined local government reforms. The study concludes with some recommendations for improving the chances of success for local government reforms in Jamaica.

About the author



Dr Jimmy Kazaara Tindigarukayo is a Senior Fellow at the Sir Arthur Lewis Institute of Social and Economic Studies, University of the West Indies, Mona Campus. He teaches Research Methodology in Social Sciences to graduate students of the institute, and his current area of research is public sector reform. Dr Tindigarukayo has published several articles in refereed journals, and is currently conducting a study on the implementation of the executive agency model in Jamaica.



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The Classification of Youth Onset Diabetes in Jamaica

Principal Investigator: Dr. Marshall Tulloch-Reid
TMRI: Epidemiology Research Unit

Co-investigators: Professor Everard Barton, Department of Medicine
Professor Monica Smikle, Department of Microbiology
Professor Rainford Wilks, Epidemiology Research Unit
Dr. Michael Boyne, Tropical Metabolism Research Unit
Dr. Eric Choo-Kang, Department of Pathology
Dr. Rosemarie Wright-Pascoe, Department of Medicine
Dr. Robert Parkes, Department of Medicine

Type-1 diabetes is the predominant form of youth onset diabetes worldwide, accounting for most cases of the disease with an onset before the age of 20 years. Changing diets and low physical activity levels have resulted in increasing rates of obesity in youth. Consequently, type 2 diabetes, once considered a disease of middle age, is now occurring more frequently in youth. A population-based survey (2000 Ministry of Health Lifestyle Survey) of Jamaican youth 15-24 years old found that 15.6% were overweight and 9.3% were obese. The experience in other countries would suggest that Jamaica's predominantly black population with a significant number of overweight and obese youth is a reservoir from which health service professionals can expect to find youth with type 2 diabetes.

This ongoing research project will entail a cross-sectional study of 60 subjects attending the Diabetes/Endocrinology Clinics at the University Hospital of the West Indies / Kingston Public Hospital, diagnosed before their 25th birthday and after January 1, 1998. For each subject, a series of tests (medical history, physical examination, laboratory tests and a medical chart review) is being carried out to classify the subject according to the type of diabetes present. The frequency of diabetes complications and related risk factors will also be determined.

The treatment of type 2 diabetes and its complications in adults already places a huge burden on the limited health resources in Jamaica. Should the results of this study indicate that a significant proportion of youth have type 2 diabetes, a more aggressive campaign to reduce obesity and encourage Jamaicans to adopt healthy lifestyles at an early age would be critical.



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New Initiatives

Caribbean Childhoods: From Research to Action

Principal Researcher: Professor Susan Walker
TMRI: Epidemiology Research Unit

The aim of the project is to publish a special issue of the journal of the Children's Issues Coalition, *Caribbean Childhoods*, in early 2005 that will focus on various issues associated with the theme, "Children at Risk". This upcoming issue, *Volume Two*, will present a collection of papers on the following:

- *HIV/AIDS and Affected Jamaican Children – A Vulnerable Generation*
Russell Pierre, D Hope Ramsay, Mark Loudon
- *Disrupted Care-Giving Relationships and Emotional Well-Being in School-Age Children Living in Inner-City Communities*
Audrey Pottinger
- *An Investigation of the Physical and Psychological Presence of the Jamaican Father*
Marina Ramkissoon
- *Developmental Risk and Home Environment in Preschool Children*
Janice Hayes
- *Disciplinary Practices among Parents of Six Year Olds in Jamaica*
Maureen Samms-Vaughan, Sian Williams, Janet Brown
- *Aggressive Youth and Youth Experiences of Violence in Kingston, Jamaica*
Julie Meeks Gardner and Christine Powell
- *Change From Within – A Model for Change in Jamaican Schools*
Pauletta Chevannes

Caribbean Childhoods: From Research to Action is an annual publication, edited by Coalition members. The series provides an avenue for the dissemination of research and experiences in the relevant fields as well as a forum for discussion of issues related to children that are of interest to the readers and contributors. Articles are peer reviewed.

The Children's Issues Coalition of the University of the West Indies comprises academics and practitioners with an interest in children's issues such as their health, development, behaviour and education. The group aims to encourage collaboration and coordination of research, training and outreach in these areas.



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Gender Differences and Neuro-endocrine Regulation of Cognition

Principal Researcher: Dr. Lauriann Young
Department of Basic Medical Sciences

The purpose of this ongoing research project is to investigate the differential neuroprotective influence of gonadal hormones on cognitive functioning in the ageing brain. The improvements in health-care world-wide have given rise to an increasing trend in the average life expectancy and an accompanying rise in senile dementia. Alzheimer's disease is the most common form of dementia among older people and is characterized by a progressive loss of cognitive ability, memory and mood. This disease is more likely to affect the postmenopausal female than males of a similar cohort. Surprisingly, very little is known of the neuroprotective role, if any, that estrogen plays in the aged male brain, or whether testosterone provides any neuroprotection on cognitive ability.

The study is therefore designed to investigate the effects of estrogen (the female hormone) and testosterone (the male hormone) on specific aspects of learning and memory in aged animals; and to assess whether testosterone provides any neuroprotective role on cognition, as reported in the literature for estrogen. An important part of this study is the ability to assess minute quantities of gonadal hormones in the project's animal population of rats. This involved the application of the technique of chemiluminescence to achieve detectable physiological levels of these hormones in the rats. This technique utilizes a luminometer that is constructed to measure the maximum available light emitted from extremely small samples. Its superior sensitivity, low background and wide dynamic range distinguish it from other analytical techniques.

The study comprised three treatment groups of old male rats, whose learning and memory of a given task were compared with that of non-treated male and female rats (controls) of a similar age cohort. Animals were trained in an operant system, utilizing a complex discriminative learning task. Upon attainment of a high score on the correct performance rate, some animals underwent surgery to remove the influence of the gonadal hormones on the brain. Memory was then assessed in all animal groups after 2 weeks. Data are still being collected and preliminary results so far obtained are very encouraging. As reported in the literature, estrogen-treated animals showed a significant enhancement of learning and memory, and, it appears, estrogen has important neuroprotective effects on cognition in both males and females.

It is hoped that the findings of this study may help to clarify the influence of estrogen in the aetiology of senile dementia and provide a better understanding of the management of this disease in both males and females.