



University of Technology, Jamaica

Faculty of Science and Sport



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Inaugural Scientific Conference

*“Science, Technology and Sport:
Bridging the Gap between Research and Practice”*

8 - 10 June 2011 - Knutsford Court Hotel

PROGRAMME

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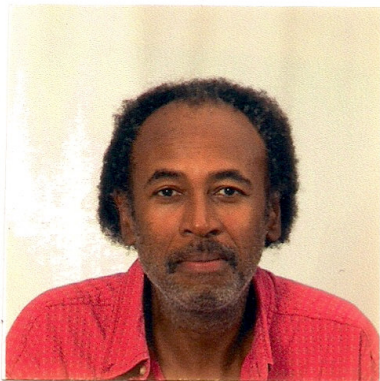
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Plenary Speaker Professor Yannis Pitsiladis BA (Hons), MMedSci, PhD, FACSM



Dr. Yannis Pitsiladis is a Reader in Exercise Physiology at the Institute of Cardiovascular & Medical Sciences in the College of Medicine, Veterinary & Life Sciences at the University of Glasgow, Adjunct Distinguish Professor of the University of Technology, Jamaica and founding member of the “International Centre for East African Running Science” (ICEARS) set up to investigate the determinants of the phenomenal success of east African distance runners in international athletics. Recent projects also include the study of elite sprinters from Jamaica and the USA and the study of world class swimmers (e.g., Why are there very few black swimmers?). He is a Visiting Professor in Medical Physiology at Moi University (Eldoret, Kenya) and Addis Ababa University (Addis Ababa, Ethiopia). He is a member of the Scientific Commission of the International Sports Medicine Federation (FIMS) and a member of the World Anti-Doping Agency (WADA) List Expert Group; the WADA Group in charge of establishing the Prohibited List annually. He is also a Fellow of the American College of Sports Medicine (ACSM).

Plenary Speaker Professor Garth Baker, BSc, PhD



Garth Baker obtained a Ph.D. degree in Mathematics from Cornell University in Ithaca, New York, in 1973. His research interests and activities have led to both long-term and visiting positions in several universities in Europe, as well as in North and South America. The most notable of these institutions include the Ecole Polytechnique Federal de Lausanne, in Switzerland; Harvard University in Cambridge, Massachusetts, U.S.A., Universite de Paris V, Jussieu, in Paris, France, and the Universidade Federal do Rio de Janeiro, in Brasil. His most recent academic affiliation has been at the Universita di Roma, La Sapienza, in Rome, Italy.

Professor Baker has been one of the driving forces in the creation of the recently incorporated Caribbean Institute for Mathematical Sciences (CIMS), a not-for-profit research organization, dedicated to research and education in the mathematical sciences, in support of sustainable development in the region. He currently serves as Director of Research at CIMS, where he pursues organizing research and educational activities centred around mathematical modelling and computer simulation for applications in areas such as Mathematical Finance, Risk Management in Agriculture, Health and Environmental Sciences.

Professor Baker's personal research interests are currently at the interface of differential geometry, and the theory of multi-particle quantum systems associated with so called topological phases of matter, which have become of interest in quantum computation. Otherwise he likes to spend his time sailing, snorkelling and listening to seventeenth century music.

Conference Programme

DAY 1: WEDNESDAY, JUNE 8

8:00 am – 9:00 am	Registration and Morning Coffee
9:00 am – 9:45 am	Opening Ceremony
9:45 am – 10:45 am	<p>Plenary Lecture 1: “Genetic Technology and Sport: Focus on Genotyping, Genetic Tests and Selection”</p> <p>Yannis Pitsiladis, Faculty of Biomedical and Life Sciences, University of Glasgow, Scotland and Adjunct Distinguished Professor, Faculty of Science and Sport, University of Technology, Jamaica</p>
10:45 am – 11:15 am	Coffee Break
11:15 am – 12:15 pm	<p><i>Scientific Papers Session 1: Sport Science</i></p> <p>“Exercise-induced Arterial Hypoxaemia”, Gail Nelson, University of the West Indies, Mona, Jamaica</p> <p>“Sports Psychology Intervention: Examining the efficacy of mental skills training of the University of the West Indies (Mona Campus) track and field team”, Olivia Kelly Ann Rose, University of the West Indies, Mona, Jamaica</p>
12:15 pm – 1:15 pm	Lunch
1:15 pm – 2:45 pm	<p><i>Scientific Papers Session 2: Practical Biology</i></p> <p>“Forensic Entomology: How Can Necrophagous Insects Aid Legal Investigations?” Paul Ivey, University of Technology, Jamaica</p> <p>“Effect of Fungicides and Biocontrol Agents for the Management of Rust Disease of Aonla under Dryland Vertisol”, Subramanian Gomathinayagam, University of Guyana</p> <p>“Cytochrome P450 (Cyp) Inhibition Screening with Extracts from Jamaican Plants”, Sheena Francis, University of Technology, Jamaica</p>
2:45 pm – 3:00 pm	Tea Break
3:00 pm – 3:30 pm	Sponsor Presentation: “An Introduction to Ultra Performance Liquid Chromatography (UPLC)”, Oscar V. Deliz, Waters Technologies

3:30 pm – 4:30 pm	<p><i>Scientific Papers Session 3: Industrial Applications</i></p> <p>“An Industrial Overview and Applications of Systems Integration and Automation in Science and Engineering”, Abdul H. Islam, IBM, Massachusetts, USA</p> <p>“Applying Chemistry to Industry: Conveying Concepts of Titrimetry through Analysis of Bayer Liquor by two methods using the Microlab Fs22 Equipment”, Michael Coley, University of the West Indies, Mona, Jamaica</p>
6:00 pm – 8:30 pm	Reception (Venue: University of Technology, Jamaica)

DAY 2: THURSDAY, JUNE 9

8:30 am – 9:00 am	Morning Tea and Coffee
9:00 am – 10:00 am	<p>Plenary Lecture 2: “The Role of the Mathematical Sciences in National Development”</p> <p>Professor Garth Baker, Director of Research, Caribbean Institute for Mathematical Sciences (CIMS)</p>
10:00 am – 10:30 am	Coffee Break
10:30 am – 12:00 pm	<p><i>Scientific Papers Session 4: Mathematics and Statistics in the Real World</i></p> <p>“A Study on Longitudinal Dispersion of a Solute”, Binil Sebastian, University of Technology, Jamaica</p> <p>“Optimal Scoring Rates in Twenty20 Cricket”, Peter Chami, University of the West Indies, Cave Hill, Barbados</p> <p>“Addressing Data Gaps in National Statistics: Inclusion of Cultural Diversity Variables”, Dorothy Akindele, University of Technology, Jamaica</p>
12:00 pm – 1:00 pm	Lunch
1:00 pm – 1:45 pm	Poster Session

1:45 pm – 2:45 pm	<i>Scientific Papers Session 5: The Art and Science of Teaching: Case Studies from Jamaica</i>
	“Comparison of Science and Education Students’ Performance in CSEC and Foundation Biology at the University of Technology, Jamaica”, Damian Nesbeth, University of Technology, Jamaica
	“An Investigation into the Factors that Influence Students’ Achievement in Undergraduate Statistics Modules at the University of Technology, Jamaica”, Olusegun Afis Ismail, University of Technology, Jamaica
2:45 pm – 3:00 pm	Tea Break
3:00 pm – 3:50 pm	<i>Scientific Papers Session 6: Information Technology Use in Education</i>
	“Using electronic portfolios in Physical Education”, Geoffrey Alan Haines, University of Trinidad and Tobago
	“Supporting Computer Science Education Using Social Software: Students and Lecturers Perception of Facebook”, Kemuel Gaffar, University of Guyana
3:50 pm – 4:20 pm	Sponsor presentation: “The preparation of Certified Reference Materials for synthetic wastewater and canned beef meat”, Dwight Ramdon, Bureau of Standards, Jamaica
4:20 pm – 5:10 pm	<i>Scientific Papers Session 7: The Science of Our Environment</i>
	“Bridging the Gap between Plant Protection Research Development and Plant Health”, Lisa Myers Morgan, Ministry of Agriculture and Fisheries, Jamaica
	“Mangroves in Guyana: Status, Role, Management and a Means of Livelihood in a Changing Climate”, Phillip da Silva, University of Guyana
5:10 pm – 5:30 pm	Closing Ceremony

DAY 3: FRIDAY, JUNE 10

8:00 am – 5:00 pm	Field Trip - St. Ann, Jamaica: Green Grotto Caves and Dunn's River
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ABSTRACTS

Plenary Lecture 1

“Genetic Technology and Sport: Focus on Genotyping, Genetic Tests and Selection”

Professor Yannis Pitsiladis

*College of Medicine, Veterinary and Life Sciences, Institute of Cardiovascular and Medical Sciences,
University of Glasgow, Glasgow, United Kingdom.*

Adjunct Distinguished Professor, Faculty of Science and Sport, University of Technology, Jamaica

A number of methodological approaches within the field of genetic epidemiology have been utilized to unravel the genetic basis of physical performance. The basic family/twin study approach has provided useful and reliable genetic data. A recent twin study, which comprised of 37,051 twin pairs from seven European countries, suggested additive genetic variants contribute significantly to exercise participation among the twin pairs (10). No similar studies of such magnitude have been conducted in the area of human performance. Due to the development of more advanced gene discovery techniques, genetic studies are no longer restricted to family/twin studies but expanded to include the assessment of genetic variants within populations. Population-based studies are extensively being used, particularly involving two groups - cases and controls. Population case-control studies can be further differentiated into hypothesis-free and the more commonly used hypothesis-driven approaches. The most extensively used candidate gene association study approach requires a prior hypothesis that the genetic polymorphisms of interest are causal variants or in strong linkage disequilibrium with a causal variant. This population-based genetic approach aims to define alleles or markers that segregate with a particular phenotype or disease at a significantly higher rate than predicted by chance alone, by genotyping the variants in both affected and unaffected individuals. This approach is effective in detecting genetic variants with small or modest influence on common disease or complex traits. Functional single nucleotide polymorphisms (SNPs) with tag SNPs which would cover the entire candidate gene have been used in many candidate gene association studies. Further advances in molecular technologies have enabled researchers to apply genome-wide approaches to the field. The genome-wide association study (GWAS) is a hypothesis-free approach used to detect the common variants underlying complex diseases and traits so as to help predict the disease risk and develop targeted therapy. GWAS has been successful in identifying novel genetic variants for Type 2 Diabetes Mellitus (1) and the interleukin 23 pathway in Crohn's disease (8). The GWAS approach is not without important limitations. For example, human height is a highly heritable quantitative trait as well as stable and easy to measure. In theory, the application of GWAS would be suitable in finding height-related genes. However, despite significant investment in large sample numbers, GWAS results have been disappointing as only 10% of phenotypic variation in height could be explained from the 180 associated loci to adult height in the largest ($n = 183,272$) study published to date (6) and typically

5% or less of the phenotypic variation in other smaller studies (e.g. $n \sim 30,000$ with 47 identified loci (7)). A large sample size is indeed needed in the example of human height and the occurrence of rare variants which are not well captured by GWAS may partly explain this limited success in determining the genomics of adult height. The application of the genome-wide linkage analysis approach has been successful in identifying disease genes related to monogenic disorders (4) [ENREF 36](#) but only partially successful in detecting complex genetic traits related to multiple genes. The lack of greater success is probably due to the low heritability of the examined complex traits (common variants with modest effect).

Despite numerous reports of genetic associations with health-related fitness phenotypes, there has been limited progress in discovering and characterising the genetic contribution to these phenotypes due to few coordinated research efforts involving major funding initiatives and the use primarily of the candidate gene approach. It is timely that exercise genetic research has moved into the genomics era (2). In the first study to apply the GWAS approach to exercise genetics, Bouchard and colleagues report the results of an investigation aimed at identifying the genetic variants associated with gains in maximal oxygen uptake ($\dot{V}O_2 \text{ max}$) using the resources of the subsample of Whites of HERITAGE (3). A total of 324,611 SNPs were genotyped and the most significant SNPs tested for replication in the subsample of Blacks from HERITAGE, the women of DREW (9) and the men and women of STRRIDE (5), who were all exposed to different but standardized and supervised exercise training programs. Based on single SNP analysis, 39 SNPs were significantly associated with the gains in $\dot{V}O_2 \text{ max}$. Stepwise multiple regression analysis of the 39 SNPs identified a panel of 21 SNPs which accounted for 49% of the variance in $\dot{V}O_2 \text{ max}$ trainability.

Most of the knowledge in exercise genetics has been generated primarily using classical genetic methods such as SNPs and applied to cohorts with small sample sizes. The data generated therefore from most published studies in exercise genetics need to be examined in light of the view held by some “hard core” geneticists that a study of any complex phenotype in humans is futile unless a cohort size of between 20,000-100,000 is used. It is also accepted that there will be many interacting genes involved in exercise-related traits including sporting performance and hence it is timely that genetic research has moved to the genomics era, i.e., the simultaneous testing of multiple genes. These approaches will no doubt be increasingly applied to searching the whole human genome instead of studying single genes or indeed SNPs as the cost of using whole-genome methods becomes more affordable. Particularly, the cost of large-scale sequencing will become cheaper over the next years. Seemingly reputable claims have been made that it is only a matter of time before the entire human genome can be sequenced for \$1,000. Recently, the newest Illumina sequencing machine HiSeq 2000 costs less than \$10,000 in a single run (two human genomes and 30x coverage); this cost has dramatically dropped from \$60,000 in 2008. No matter the success or failure of the GWAS approach, this approach is certainly providing the insight into genetic architecture and the molecular basis underlying human diseases and $\dot{V}O_2 \text{ max}$ traits. In the near

future, large cohorts will be routinely studied by GWAS and will provide good resources for all scientific fields including exercise genomics. This development will require a move away from the traditional method of researching in exercise science/medicine (i.e., predominantly single laboratory studies) to large well funded laboratory collaborations and therefore substantial statistical/technological power and knowhow. Only with such resources can the most strongly-acting genes be identified with confidence, gene x environment interactions be studied accurately and clinically meaningful gene x gene interactions revealed.

Plenary Lecture 2

“The Role of the Mathematical Sciences in National Development”

Professor Garth Baker

Director of Research, Caribbean Institute for Mathematical Sciences (CIMS)

Historically, Mathematical Sciences collectively refers to the interrelated fields of Mathematics in all its forms, Theoretical Physics, plus the Engineering and Computer Sciences. Today one must add the expanding activities in modelling, computation and simulation taking place in the materials, biological, social, environmental and health sciences in addition to areas of business and finance.

Recent decades have brought an explosive interest in the Mathematical Sciences as our era unveils new driving forces for the development of science; for example in relation to ecosystems conservation, telecommunications or market behaviour at the macro level, or in information and nanotechnology on the micro level. A salient common feature is the elusive understanding and capability for detailed analysis of the emergence of non-deterministic complex dynamics, hitherto ignored by traditional science. It is suggested that although blossoming initially in the service of Wall Street bankers and even for evolving strategies in high-tech warfare, the mathematics of complexity and uncertainty (succinctly dubbed ‘New Science’ by Wolfram) could ironically provide support for decision tools in managing risks attendant to alternative modes of “development” in environments with sparse resources (‘third world’).

A very subjective perspective, precipitating from concrete experiences of CIMS, will be offered as to the role that research and education in such and even more general areas of the Mathematical Sciences could play in so called “sustainable development”, in the Caribbean particularly. The lecture is of an expository, non-technical nature, aimed at general audiences including non-specialists, students and personnel from other than scientific backgrounds. No prior familiarity with the topic will be assumed.

Addressing Data Gaps in National Statistics: Inclusion of Cultural Diversity Variables

Dorothy Akindele

University of Technology, Jamaica

Health differentials are strongly associated with ethnicity and genetics, endemic or native prevalence of disease, and culture specific behavioural characteristics. Furthermore, migration is suggested to have a public health impact on the host nation (International Metropolis 2001). However there is a paucity of research that are based on national health or other large datasets which focuses on cultural diversity and cross-classifies country of birth (COB) with other health or socio-economic data items. As such the Australian Government provides incentives for epidemiological research concerning migrant and refugee health. According to a Commonwealth report (Commonwealth of Australia 2004), it is difficult to get competitive funding for non-English Background health issues. The report stated that “dealing with non-English speaking population groups made up only 2.2 per cent of published articles and attracted only 1.5 per cent of competitive research grant funding”. Generally, few studies explore health differences between immigrant groups and the general population. Inclusion of ethnicity variables in national datasets may encourage this. Collecting accurate information on cultural diversity is argued to be the key to planning for effective service provision for Culturally and Linguistically Different (CALD) people (Department of Human Services, 2004).

Optimal Scoring Rates in Twenty20 Cricket

Peter Chami, Bernd Sing, Doneal Thomas

University of the West Indies, Cave Hill, Barbados

We analyse a mathematical model of Twenty20 cricket which utilises a dynamic program to calculate, at any stage of an innings, the optimal scoring rate. This provides an estimate of the total number of runs to be scored in the first innings or the chance of winning in the second innings. This analysis may be used to propose a batting strategy (in terms of the best run rate at any stage of the innings), to describe the influence of powerplay overs, to quantify the effects of selecting particular batsmen for a side and to suggest a method for the development of alternative measures of player performance. Results suggest that the team batting second has an intrinsic advantage. Our findings are compared with data from international Twenty20 games to date. Possible extensions to the model are discussed.

Applying Chemistry to Industry: Conveying Concepts of Titrimetry Through Analysis of Bayer Liquor by two Methods using the Microlab Fs22 Equipment

Michael Coley, Jerron Farquharson, Anthony Greenaway

University of the West Indies, Mona, Jamaica

Titrimetric analyses are almost always included as a topic in the tertiary level chemistry curriculum. Many of the concepts are best taught through practical laboratory exercises that permit hands-on interaction with the materials and methods typically used. In many instances, the procedures used are mundane and are not the ones used in industry and as a result students often complete the activities but have very little interest in learning the concepts that are emphasized. This paper discusses the use of the MicroLab FS22 equipment in the analysis of Bayer process liquors. The activity compares results obtained with use of a complexometric titration procedure and a potentiometric exercise. The approach employs a versatile and inexpensive laboratory equipment which is used to analyse a sample of significant industrial relevance. Statistical tests are eventually used to evaluate the methods.

Keywords: Bayer, liquor, titrimetry, complexometric, potentiometric.

Mangroves in Guyana: Status, Role, Management and a Means of Livelihood in a Changing Climate

Phillip da Silva
University of Guyana

The Guyana coastline is a narrow strip of land of varying width that stretches approximately 425km from the Waini River to the Corentyne River. Over time the mangrove belt has been severely depleted but the natural cycle of erosion and recovery and mangrove degradation are not fully understood. Recently there have been concerted efforts to include climate change considerations in public policy and this has been enshrined in the Low-Carbon Development Strategy wherein there is a central focus on forest conservation, including the protection of coastal and riverine mangroves.

The New National Mangrove Management Action Plan has identified rehabilitation and replanting of mangroves along coastal areas of Guyana as one of its core objectives. The promotion of community involvement in mangrove nursery development and replanting is also a major aspect of the action plan and has provided an alternative means of livelihood income for some communities.

The renewed interest in managing Guyana's mangroves has led to an overall improvement in the planning and organization of efforts regarding research and management of Guyana's mangroves. There is also the increased vigilance to promote the results of such research as a means of informing policy decisions especially in the light of climate change and the promotion of a low Carbon Development Strategy.

Keywords: Guyana, mangroves, climate change, Low Carbon Development Strategy, mangrove management and conservation, National Mangrove Management Action Plan

Cytochrome P450 (CYP) Inhibition Screening, with Extracts from Jamaican Plants

Sheena Francis^{1,2}, S. Badal², D. Haase², G. Huang³, T.J. Tzeng³, H. Jacobs², E. Brantley⁴ and R. Delgoda²

¹University of Technology, Jamaica, ²University of the West Indies, Mona, Jamaica, ³Clemson University, USA, ⁴Center for Health Disparities and Molecular Medicine, Loma Linda University, USA

The island of Jamaica hosts a wide diversity of flora and fauna, some of which are endemic to the island. Historically, the extracts from plants grown on the island have shown diverse bioactivity, ranging from anti-helminthic, fungicidal to chemoprevention. Extracts were obtained from Jamaican plants, designated X2, and X3, their inhibitory effect on both recombinant CYP1 family enzymes and human liver microsomes using fluorescent assay were investigated. Potent inhibition was obtained against recombinant CYP1A1 enzymes with X2 (IC₅₀ of 0.13 ± 0.00 μM), while weak inhibitions were observed with recombinant enzyme CYP1A2 and CYP1B1 (IC₅₀ of 19.56 ± 1.47 μM and 14.18 ± 5.58 μM respectively). X3 showed moderate inhibition of recombinant CYP1A1 enzymes with X2 (IC₅₀ of 7.00 ± 1.27 μM), however, it too weakly inhibited recombinant CYP 1A2 and CYP1B1 (IC₅₀ of 20.15 ± 0.81 μM and 14.97 ± 2.17 μM respectively). X2 and X3 were further assessed for inhibition of recombinant CYP2C19, CYP2D6 and CYP3A4 enzymes, enzymes readily expressed in liver cells. The inhibition of the enzymes by X3 was fairly moderate to weak (IC₅₀ of 3.59 ± 1.10 μM; 19.08 ± 0.94 μM and 10.12 ± 3.87 μM respectively) and showed no inhibition on human liver microsomes. X2 however potently inhibited CYP2C19 (0.08 ± 0.03 μM) but showed moderate inhibition on CYP 2D6 and CYP3A4. The effect of X2 on human liver microsomes using CEC as a substrate gave IC₅₀ value of 0.14 ± 0.012 μM, when blocked using furaphylline IC₅₀ value was 0.33 ± 0.05 μM. The results of X2 were comparable to that observed with individual recombinant enzymes. Another compound designated Gg, which showed CYP 1 inhibitory effects in a previous study was further analysed for its apoptotic effect on human MCF-7 cells. At 48 hr incubation in both 0.01 and 1 μM Gg had a higher percentage of cells in early apoptosis (50.9 ± 6% and 45.3 ± 0.3 %) respectively, with cells just entering the late apoptosis phase (2.015 ± 0.695 % and 0.225 ± 0.031 %) respectively, which is more effective than some drugs currently used

in chemoprevention studies. The analysis of these compounds and their selectivity for the CYP enzymes may have implications in the chemoprevention.

Keywords: Anticancer, CYP450, chemoprevention, Jamaican Plants.

Supporting Computer Science Education using Social Software: Students and Lecturers Perception of Facebook

Kemuel Gaffar, Lenandlar Singh
University of Guyana

Web 2.0 technologies and Social Software such as Facebook and Twitter promise to revolutionize the way we conduct our daily lives. From their inception, Business, Politics, and almost every other domain have benefitted significantly from these technologies. In more recent times, the use of these technologies to facilitate, augment and even transform teaching and learning has engaged the thoughts of Education researchers.

In this paper we present a follow-up study on the use of Facebook Groups to support an undergraduate computer science course. Specifically, we continued our exploration of the use of a Facebook group by students enrolled in an undergraduate course on Computer Networking. Students were engaged in the development of an online tutorial on a chosen topic from their course of study over the course of the semester.

We compare this study with our previous study where we examined student engagement with a Facebook group in developing an online tutorial. Results suggest that students were more participative in the current study when compared with the previous. Evidence indicates that students were more thoughtful and engaged in the tutorial development process.

In addition, we extended our study to examine students' and lecturers' perception of the use of Facebook and Social Networking Technologies (SNSs) in general to support teaching and learning. Feedback from students and lecturers indicates that the use of social networking technologies to support teaching and learning is potentially promising and deserves further exploration.

Effect of Fungicides and Biocontrol Agents for the Management of Rust Disease of Aonla under Dryland Vertisol

Subramanian Gomathinayagam, M. Rekha, M. Theradimani, K. Siddeswaran
University of Guyana

Studies were conducted to select the effective fungicides and biocontrol agents for the management of Aonla rust. Two spraying of fungicides and biocontrol agents were given at 20 days interval. The results showed that the disease intensity was 18.6% in mancozeb treatment as against 52.4% in the control. This was followed by chlorothalonil (0.2%) and copper oxychloride (0.4%) which recorded 21.4% and 24.3% disease intensity respectively. The second year confirmation trial showed that PDI was low in treatment Chlorothalonil (13.6) followed by Copper oxychloride (17.3), Mancozeb (19.6). In the case of *T. viride* (34.7), *Pseudomonas flourescens* (27.7) and untreated plot showed (41.7). The use of biocontrol agent viz., *T. viride* at the rate of 5g/l (41.4) and the plant extract viz., *P. julifer* (40.5) at the rate of 10% were effective in reducing the disease. The disease intensity in this treatment were 41.4% and 40.5% respectively.

Key words: biocontrol agents, fungicides, PDI, Aonla

Using Electronic Portfolios in Physical Education

Geoffry Alan Haines

University of Trinidad and Tobago

The use of electronic or digital portfolios is growing worldwide. They take up much less space than a normal notebook in a three ring binder and can easily replace this outdated method of showcasing or documenting student's work. Students can adapt an electronic portfolio to be used in a resume or on a webpage to aid in securing employment or in applying to colleges and universities. Schools can use the e-portfolio to document students' work and as artefacts to be used for accreditation visits.

Electronic portfolios present students' work in an organized manner using power point as a presentation medium and hyperlinks to actual assignments and student provided pictures or videos. They allow the viewer to actually see a student teach a class, or do a presentation, something a paper notebook, journal or portfolio cannot do. Students can add music in the background to enhance the presentation or to demonstrate an original composition. During the process of creating the portfolio students become familiar with a variety of technological processes which will aid in their knowledge and use of technology and build their confidence with its use.

An Industrial Overview and Applications of Systems Integration and Automation in Science and Engineering

Abdul H. Islam

IBM, Massachusetts, USA

Hardware and software components that serve different purposes often need to work cooperatively to produce measurements and automation results that we can obtain value from almost instantaneously. Many of these components do not speak the same language and often times what is needed is real time data acquisition and analysis from the various components. This has been a challenge historically. With the advent of modern data acquisition and measurement tools, the automation necessary to bridge the hardware and software divide with regard to data collection exist and can be used to perform analytics and present meaningful results. Whether it is for analyzing PCBs (Printed Circuit Boards) or for modelling reliability of systems, the possibilities for automation are endless.

Real world examples of systems automation using off-the-shelf tools available today will be drawn from projects ranging from processor measurements to material processing of wafers, and more recently from the simulation of high performance computing system environments. The focus will be on how these tools along with development best practices can be leveraged to effectively obtain results a research project.

An Investigation into the Factors that Influence Students' Achievement in Undergraduate Statistics Modules at the University of Technology, Jamaica

Olusegun Afis Ismail¹, Kevin Williams¹, Errol Rowe¹, Claudia Smith Kelly²

¹University of Technology, Jamaica, ²Grand Valley State University, Michigan, USA

This study examines students' achievements in undergraduate statistics modules at the University of Technology, Jamaica (UTech). The aim of the study is to identify the underlying factors that influence students' achievements in these statistics modules. Three undergraduate statistics modules were selected for the study. The modules were, Introductory Statistics, Business Statistics and Biostatistics. The content of

the syllabi outlines indicates that these modules are classified as introductory statistics. The contents of the three modules included a definition of statistics, forms of descriptive statistics such as, measures of central tendency and dispersion, basic probability and types of events, odd ratio, relative risk, discrete random variable and special cases of binomial and Poisson distributions, point and interval estimation of the mean and proportion, correlation and simple linear regression, hypothesis testing: two means or less for large and small samples, two proportions or less for large samples and chi-square test of association. The modules were delivered to students satisfying course requirements in Computing and Information Technology, Nursing, Urban and Regional Planning, Environmental Health and Business Administration.

A questionnaire consisting of forty-six items was developed and administered to the students. The items focused on students' prior knowledge, concerns and beliefs, students' perception of lecturers'/tutors' module delivery and difficulty of topics, and students' learning strategies. These variables represent a sample of the independent variables used in the analyses. Correlation analyses of students' results and the independent variables were conducted to determine relationships. In addition to correlation analyses, T-tests were conducted using students' results and the independent variables to determine significant statistical difference. The findings revealed that there were significant relationships between students' results and students' likeness for statistics or mathematics, as well as student fear of statistics or mathematics. Additionally, a significant relationship existed between students' results and students' perception of lecturers'/tutors' delivery of the learning materials, students' perception of lecturers'/tutors' enthusiasm for the module content, students' perception of difficulty of topics such as measures of central tendency and dispersion, and students' disapproval of multiple choice and open-book assessments.

Forensic Entomology: How Can Necrophagous Insects Aid Legal Investigations?

Paul W. Ivey

University of Technology, Jamaica

Forensic Entomology involves the use of insects and their arthropod relatives that inhabit decomposing remains to aid legal investigations. The broad field of forensic entomology is sub-divided into three main areas: medico-legal, urban, and stored product pests. The medico-legal aspect, which is the focus of this presentation, deals with studying the population dynamics of necrophagous (or carrion-feeding) insects that typically infest corpses to determine *elapsed time since death*. There are two main ways of using insects to determine elapsed time since death: (i) studying the successional waves of insect species inhabiting corpses, and (ii) ascertaining the age and developmental stage of fly larvae present on or proximate to corpses. Most cases of sudden or suspicious deaths that involve a forensic entomologist are 72 hours or more old, because up to this time, other forensic methods are equally or more accurate than insect evidence. However, after three days, insect evidence is frequently the most accurate and sometimes the only method of determining elapsed time since death. The focus will be on the two main ways of using insects to determine elapsed time since death and aims to contribute to the building of awareness of the contribution of forensic entomology in medico-legal investigations.

Bridging the Gap between Plant Protection Research Development and Plant Health

Lisa Myers Morgan

Research and Development Division, Ministry of Agriculture and Fisheries, Jamaica

This paper seeks to highlight the gaps that exist between plant protection research development and its implementation in plant health; such as limited relevant local knowledge transfer, limited collaboration, and scarce human and financial resources. A proposed approach to bridge the gap based on the development of the National Plant Health Policy and feedback from national stakeholder consultation will be presented.

Exercise-Induced Arterial Hypoxaemia

Gail Nelson

University of the West Indies, Mona, Jamaica

“There are no other normal stresses to which the body is exposed that even nearly approach the extreme stresses of heavy exercise.” Guyton, 1991

The truth of this quotation becomes most apparent as one examines the phenomenon of exercise-induced arterial hypoxaemia (EIAH) as seen in so-called extreme athletes (Prefaut et al 2000). The term “extreme athletes” was coined by Prefaut and colleagues (Prefaut et al 2000) to “describe endurance-trained athletes who train at an extremely high intensity level and are able to exceed the limit of the cardiovascular system in such a way that unusual failure of the respiratory system appears”. The respiratory system has not classically been considered a critical limitation to maximal oxygen uptake (VO₂max) during exercise (Hale 2003). However, it is now commonly accepted by physiologists that the elite endurance athlete is the exception to the general rule that ventilatory adjustment to high-intensity exercise results in a decrease in alveolar carbon dioxide partial pressure (PACO₂) with an increase in PaO₂ (McArdle et al 1994). The elite endurance (or extreme) athlete is considered to have such highly adapted cardiovascular and musculoskeletal systems, so that at maximal exercise intensities the pulmonary system becomes the limiting factor (McArdle et al 1994). More than half a century ago Lilienthal (as cited in Nielsen 2003) had reported a decrease in the arterial partial pressure of oxygen with exercise, and Harrop in 1919 (as cited in Nielsen 2003) reported exercise-associated oxygen desaturation. However, in 1958 Mitchell and colleagues (as cited in Nielsen 2003) dismissed these reports as “abnormal physiology”. Over the past two decades, there has been a resurgence of interest in the phenomenon whereby there is less-than-perfect gas exchange during exercise in the healthy.

Comparison of Science and Education students’ performance in CSEC and Foundation Biology at the University of Technology, Jamaica

Damian Nesbeth

University of Technology, Jamaica

This study sought to investigate the relationship between students’ CSEC subjects and performance in the first year module Foundation Biology. The eleven research questions addressed the relationship between CSEC subjects, the competency in comprehension and computation with Foundation Biology. A correlational design was used to measure the degree of association between students’ performance in Foundation Biology and grades obtained in select CSEC subjects. Results of the study population of 52 students from the first two cohorts of the programme revealed the following variables as having the strongest correlation with performance in Foundation Biology: Expression in CSEC English Language ($\rho = -0.248$, $p = 0.129$), overall grade in CSEC English Language ($\rho = -0.233$, $p = 0.138$) and Comprehension in CSEC Mathematics ($\rho = -0.122$, $p = 0.452$).

**Sports Psychology Intervention: Examining the Efficacy of Mental Skills
Training of the University of the West Indies (Mona Campus)
Track and Field Team**

Olivia Kelly Ann Rose

University of the West Indies, Mona, Jamaica

Despite the importance of mental training for optimal performance of athletes, not much emphasis is placed on preparing athletes mentally for competitions. The purpose of this research was to examine the effectiveness of a twelve week mental skills training programme conducted with athletes from the University of the West Indies (Mona) Track and Field Team using a two group pre-test- post test true experiment. Track Athletes were randomly assigned to either a group workshop focusing on mental preparation (control group; n = 10) or to the group workshop plus intensive individual sessions (treatment; n=10). All athletes were fulltime students from the University of the West Indies, Mona between the ages of (18- 25). Measures of goal setting, visualization, self efficacy, progressive relation, concentration and anxiety, were administered before and after the intervention. Results of the study indicated that there was an increase in physical preparation of the athletes from the individual sessions. However, no statistically significant changes were observed on the other outcome measures. Changes on the other scales administered were not significant. Further research on mental skills training with a larger sample size with the Caribbean context is needed.

Keywords: sports psychology intervention, mental skills training, athletes.

A Study on Longitudinal Dispersion of a Solute

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The theory of dispersion has many applications in the field of Chemical Engineering, Environmental Dynamics and Biomedical Engineering. The dispersion of a solute in an oscillatory flow in a tube is studied by modelling the fluid as a non-Newtonian fluid. The generalized dispersion model is used to analyse the dispersion process and with this method the entire process is described in terms of convection and diffusion coefficients. One of the main objectives of the study is to understand the dispersion process in cardiovascular flows. It is observed that the oscillatory nature of the flow of the fluid has contributed significantly to the total dispersion process. The fluctuations and magnitude of the dispersion coefficient is seen to be decreasing with both the frequency parameter and the non-Newtonian nature of the fluid.

SPONSOR'S PRESENTATIONS

An Introduction to Ultra Performance Liquid Chromatography (UPLC)

Oscar V. Deliz

Waters Technologies Corporation, Puerto Rico

Ultra Performance LC™ Systems take advantage of technological strides made in particle chemistry performance, system optimization, detector design, and data processing and control. When taken together, these achievements have created a step-function improvement in chromatography performance. Defined as UPLC™, this new category of analytical separation science retains the practicality and principles of HPLC while increasing the overall interlaced attributes of speed, sensitivity and resolution. This presentation will introduce the audience to the advantages of sub 2µm column chemistries that, combined with a holistically designed and proven performance ACQUITY UPLC™ system, produces chromatographic results with higher-quality information and reap benefits in optimized productivity.

The preparation of certified reference materials for synthetic wastewater and canned beef meat

Dwight C. Ramdon

Bureau of Standards, Jamaica

A synthetic wastewater sample containing the metal ions Aluminum, Arsenic, Cadmium, Chromium Copper, Nickel, Lead, and Zinc was prepared and sealed in 125 mL bottles. These samples were analyzed using different techniques by International Metrology Institutes. Consensus values for all the metals were assigned and the certified reference material is available to testing laboratories. The associated certificate contains traceability, certified values and uncertainty.

Cooked ground homogenized beef meat was canned and sterilized for preservation. Some cans have been analyzed for Nitrogen (protein), fat, sodium and potassium. Consensus values for these parameters were determined by International Metrology Institutes. The material is available to testing laboratories conducting nutrition analyses. These materials provide traceability of measurements and introduce a mechanism for the quality control of laboratory test methods. These materials are necessary when seeking laboratory accreditation.

The project for this preparation of Certified Reference Material received funding from Organization of American States (OAS) and was coordinated through the Mexican Centre for National Metrology (CENAM).

LIST OF SPEAKERS

1. Dorothy Akindele: dakindele@utech.edu.jm
ADDRESSING DATA GAPS IN NATIONAL STATISTICS: INCLUSION OF CULTURAL DIVERSITY VARIABLES.
2. Garth Baker: garthbaker.cims@gmail.com
THE ROLE OF THE MATHEMATICAL SCIENCES IN DEVELOPMENT
3. Peter Chami:
OPTIMAL SCORING RATES IN TWENTY20 CRICKET
4. Michael Coley: michael.coley@uwimona.edu.jm
APPLYING CHEMISTRY TO INDUSTRY: CONVEYING CONCEPTS OF TITRIMETRY THROUGH ANALYSIS OF BAYER LIQUOR BY TWO METHODS USING THE MICROLAB FS22 EQUIPMENT
5. Phillip da Silva: nessie159@yahoo.com
MANGROVES IN GUYANA: STATUS, ROLE, MANAGEMENT AND A MEANS OF LIVELIHOOD IN A CHANGING CLIMATE
6. Oscar V. Deliz: Oscar_Deliz@waters.com
AN INTRODUCTION TO ULTRA PERFORMANCE LIQUID CHROMATOGRAPHY (UPLC)
7. Sheena Francis: sheenafrancis@yahoo.com
CYTOCHROME P450 (CYP) INHIBITION SCREENING, WITH EXTRACTS FROM JAMAICAN PLANTS
8. Kemuel Gaffar: kemuel_16@yahoo.com
SUPPORTING COMPUTER SCIENCE EDUCATION USING SOCIAL SOFTWARE: STUDENTS AND LECTURERS PERCEPTION OF FACEBOOK
9. Subramanian Gomathinayagam: drgoms@rediffmail.com
EFFECT OF FUNGICIDES AND BIOCONTROL AGENTS FOR THE MANAGEMENT OF RUST DISEASE OF AONLA UNDER DRYLAND VERTISOL
10. Geoffry Alan Haines: geoffry.haines@utt.edu.tt
USING ELECTRONIC PORTFOLIOS IN PHYSICAL EDUCATION
11. Abdul H. Islam: abdulhislam@gmail.com
AN INDUSTRIAL OVERVIEW AND APPLICATIONS OF SYSTEMS INTEGRATION AND AUTOMATION IN SCIENCE AND ENGINEERING
12. Olusegun Afis Ismail: iafis@utech.edu.jm
AN INVESTIGATION INTO THE FACTORS THAT INFLUENCE STUDENTS' ACHIEVEMENT IN UNDERGRADUATE STATISTICS MODULES AT THE UNIVERSITY OF TECHNOLOGY, JAMAICA
13. Paul W. Ivey: Paul.Ivey@utech.edu.jm
FORENSIC ENTOMOLOGY: HOW CAN NECROPHAGOUS INSECTS AID LEGAL INVESTIGATIONS?
14. Lisa Myers Morgan: lrsmyers@gmail.com
BRIDGING THE GAP BETWEEN PLANT PROTECTION RESEARCH DEVELOPMENT AND PLANT HEALTH
15. Gail Nelson: gail.nelson02@uwimona.edu.jm
EXERCISE-INDUCED ARTERIAL HYPOXAEMIA
16. Damian Nesbeth: dnesbeth@utech.edu.jm
COMPARISON OF SCIENCE AND EDUCATION STUDENTS' PERFORMANCE IN CSEC AND FOUNDATION BIOLOGY AT THE UNIVERSITY OF TECHNOLOGY, JAMAICA

17. Yannis Pitsiladis: Yannis.Pitsiladis@glasgow.ac.uk
GENETIC TECHNOLOGY AND SPORT: FOCUS ON GENOTYPING, GENETIC TESTS AND SELECTION
18. Dwight C. Ramdon: DRamdon@bsj.org.jm
THE PREPARATION OF CERTIFIED REFERENCE MATERIALS FOR SYNTHETIC WASTEWATER AND CANNED BEEF MEAT
19. Olivia Kelly Ann Rose: oliviakrose@yahoo.com
SPORTS PSYCHOLOGY INTERVENTION: EXAMINING THE EFFICACY OF MENTAL SKILLS TRAINING OF THE UNIVERSITY OF THE WEST INDIES (MONA CAMPUS) TRACK AND FIELD TEAM

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