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COLLECTION OF ABSTRACTS (AS SENT BY THE AUTHORS)

Speakers | TWAS TYAN

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Glucose Utilization And Anti-Oxidative Mechanisms Of The Aqueous Hunteria umbellata Seed Extract In Alloxan-Induced Hyperglycemic Rats

In South-west Nigeria, water decoctions of Hunteria umbellata seeds are used in the local management of diabetes mellitus (DM). Previous studies hypothesized one of the antihyperglycemic mechanisms of Hunteria umbellata seed extract (HU) was probably via increased peripheral glucose utilization. This study, therefore, was designed at evaluating the peripheral glucose utilization and anti-oxidative mechanisms of 50 mg/kg, 100 mg/kg and 200 mg/kg of HU in alloxan-induced hyperglycemic rats. Experimental DM was induced in male Wistar rats through intraperitoneal injection of 150 mg/kg of alloxan in cold 0.9% normal saline after which the hyperglycemic rats were orally treated with 50-200 mg/kg of HU for 14 days. Effects of HU on the rat body weight, percentage body weight changes and fasting blood glucose (FBG), serum insulin, liver enzyme markers, proteins, albumin, triglyceride, total cholesterol and lactate dehydrogenase as well as on hepatic tissue oxidative stress markers, liver glycogen and glucose-6-phosphatase were determined after sacrificing the rats under diethyl ether anesthesia. Results showed that oral treatments with 50-200 mg/kg of HU caused significant ($p<0.05$) alterations in the serum insulin levels. Also, HU caused significant ($p<0.001$) reversal in the decrease and increase in the hepatic glycogen levels and glucose-6-phosphatase activity, respectively, caused by alloxan-induced hyperglycemia. Similar significant ($p<0.001$) and complete reversal effects were recorded in the serum hepatic enzyme markers, total protein, albumin, triglyceride, total cholesterol and lactate dehydrogenase as well as on hepatic tissue oxidative stress markers such as superoxidase dismutase, catalase, malonialdehyde and reduced glutathione levels. All these results showed that antihyperglycemic effect of HU was mediated via increased hepatic glycogen deposit, decreased hepatic glucose-6-phosphatase activity and improvement in antioxidant/free radicals scavenging activities.

Adejuwon Adewale ADENEYE, born on the 28th July 1974, obtained his MBBS degree from the University of Ilorin; M.Sc. (Pharmacology) degree from the Usman Danfodiyo University, Sokoto, Ph.D. (Pharmacology) from the University of Lagos, Nigeria and D.Sc. (AM) from The Open University, Colombia, Sri Lanka. With over 70 scientific journal articles, 2 chapter contributions and 2 published books, three of his published articles were rated among the SciVerse ScienceDirect Top 25 Hottest Articles between 2006 and 2007. Adejuwon was a Distinguished Visiting Fulbright Research Scholar to the College of Pharmacy, University of Kentucky, U.S.A. (August 2010 - May 2011) during which he discovered a new anti-hyperglycemic drug, erinidine, from an indigenous Nigerian medicinal plant, Hunteria umbellata.

Adewuyi Adewale

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Glucose Utilization And Anti-Oxidative Mechanisms Of The Aqueous Hunteria umbellata Seed Extract In Alloxan-Induced Hyperglycemic Rats

With the depletion of oil resources as well as the negative environmental impact associated with the use of fossil fuels; self-sufficiency in energy requirement is critical to the success of any developing economy. Biodiesel is simple to use, biodegradable, nontoxic and essentially free of sulfur and aromatics. Over 70% of the population of people in Africa lives in rural areas where there are resources for agriculture. Gliricidia sepium and Baphia nitida are two underutilized plants in Nigeria; they are planted as a shade tree. Their seeds are discarded as waste in Nigeria creating a waste disposal problem. Biodiesel was produced from the oils of these underutilized seeds using a two-step reaction system. The first step is a pretreatment which involved use of 2% sulphuric acid in methanol and secondly, transesterification reaction using KOH as catalyst. Result of the method applied showed a conversion of ester content above 98% with phosphorus content below 1 ppm while the copper strip corrosion test was 1A in both biodiesel. Oil of Gliricidia sepium and Baphia nitida with high free fatty acid can be reduced in a one-step pretreatment of esterification using H2SO4 as catalyst. This one-step pretreatment reduced the problem of soap formation normally encountered when using oil with free fatty acid for the production of biodiesel, thus reducing the production cost of Gliricidia sepium and Baphia nitida biodiesel. The biodiesel produced from the oil of Gliricidia sepium and Baphia nitida exhibited properties that are in agreement with the recommended European standard (EN 14214).

Over the years, his research activities has been on the industrial applications of underutilized plant seeds and seed oils in tropical Africa which cuts across synthesis of surfactants, biofuel and major oleochemicals and their use in waste water treatment, environment, corrosion control, medicine and food. Presently, Dr Adewuyi Adewale is a Senior lecturer at Redeemer's University, Nigeria and his dream is to play active role in building Science and Technology in Africa

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Olive (Olea Europaea) Leaf Methanolic Extract Prevents HCl/ethanol-induced Gastritis In Rats By Attenuating Inflammation And Augmenting Antioxidant Enzyme Activities

Gastritis is preponderantly characterized by inflammation of the lining epithelial layer and the chronic gastritis is considered as a pre-cancer lesion. For many centuries olive (Olea europaea) leaf has been used for its putative health potential, nonetheless, to date, the gastroprotective effects of olive leaves have not been studied yet. Hence, in this study we investigated whether olive leaf extract (OLE) could protect gastric mucosa against HCl/ethanol-induced gastric mucosal damage in rats. Hcl/ethanol administration caused significant damage to the gastric mucosa, as confirmed by gastric ulcer index and histological evaluation. However, this damage was largely prevented by pre-administering 20 mg/kg omeprazole or 100 mg/kg OLE. Interestingly, the damage was completely prevented by pre-administering 200 and 300 mg/kg OLE. Moreover, OLE attenuated the inflammatory response by decreasing nuclear factor-κB (NF-κB), cycloxygenase-2 (COX-2) and tumor necrosis factor-α (TNF-α) expressions, and down-regulating inducible nitric oxide synthase (iNOS) and interleukin-1β (IL-1β) in gastric mucosa. The gastroprotective mechanism of OLE involved the promotion of enzymatic and nonenzymatic molecules (superoxide dismutase, catalase, glutathione peroxidase, glutathione reductase and glutathione reduced form), promoting nuclear factor erythroid 2-related factor 2 (Nrf2) mRNA expression, halting lipid peroxidation and preventing the overproduction of nitric oxide. Together, our findings clearly demonstrated that OLE could prevent HCl/ethanol-induced gastritis by attenuating inflammation and oxidant/antioxidant imbalance. Indeed, OLE could potentially be useful as a natural therapy for gastritis.

Dr Ahmed Esmat Abdel Moneim is currently a member in Department of Zoology. His research interest is in the area of discovering and developing of medications based on natural products aimed to treat different diseases included diabetes, neurological disorders and environmental toxicities.

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Coumarins As Potential Antioxidant Agents Complemented With Suggested Mechanisms And Approved By Molecular Modeling Studies

Syntheses of coumarins, which are a structurally interesting antioxidant activity, was done in this article. The modification of 7-hydroxycoumarin by different reaction steps was done to yield target compounds. Molecular structures were characterized by different spectroscopical techniques (Fourier transformation infrared and nuclear magnetic resonance). Antioxidant activities were performed by using various in vitro spectrophometric assays against 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical and hydrogen peroxide (H2O2). All compounds exhibited high efficiency as antioxidants compared to ascorbic acid. The highest efficiency scavenging activity was found for compound 3 (91.0 ± 5.0), followed by compounds 2 and 4 (88.0 ± 2.00; and 87.0 ± 3.00). Ascorbic acid was used as a standard drug with a percentage inhibition of 91.00 ± 1.5. The mechanism of the synthesized compounds as antioxidants was also studied. Hartree/Fock based quantum chemical studies have been carried out with the basis set to 3-21G, in order to obtain information about the three-dimensional (3D) geometries, electronic structure, molecular modeling, and electronic levels, namely HOMO (highest occupied molecular orbital) and LUMO (lowest unoccupied molecular orbital), to understand the antioxidant activity for the synthesized compounds.

Al-Amiery (h-index= 19), is an Professor at University of Technology/ IRAQ. He has over 100 scientific papers and more than 10 patents. He is an internationally expert in many areas of applied chemistry. Recent publications include a paper published in Elsevier on novel equation for efficiencies of corrosion inhibitors. Al-Amiery holds the best three Iraqi scientists award provided by the presidency of the Iraqi parliament in 2016. He has been awarded the Medal of scientific excellence (2014), and also Hold Science Day Awards from the Ministry of Higher Education and Scientific Research for six consecutive years (2010-2016). Al-Amiery selected for the Who's Who for International Executives 2015. Al-Amiery is a TWAS - Young Affiliates.

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Waste To Energy Potential Mapping For Commercial Waste In Nepal

Waste is a by-product of human activities which tends to increase with rapid urbanization, improved living standards and changing consumption patterns. Waste to energy conversion is one of the sustainable solutions for management of waste, providing both decrease in waste and extraction of energy. The main objective of this study is to estimate and map the national waste to energy potential for commercial waste of Nepal. This study incorporates waste to energy potential from hotels, livestock farms, sugar mills, liquor industries and vegetable markets. The amount of waste produced, biogas potential, methane potential, heat energy output and electrical energy output have been estimated. The total maximum possible biogas potential of Nepal from livestock sector has been estimated to be 67,39,361 m3/day. The biogas potential from commercial farms of the country has been found to be 4,78,102 m3/day, which is almost 7.1% of the estimated potential. The biogas and methane potential of the country from sugar mills has been found to be 1,98,825 m3/day and 1,19,295 m3/day respectively. The maximum estimated heat and electrical energy output have been calculated to be 10,935.4 kW and 8,201.5 kW respectively. The maximum potential has been estimated in Everest Sugar mill with potential of 36,150 m3/day and the minimum potential has been found in Indira and Ganga Sugar Mill with potential of 3,615 m3/day. Furthermore, for liquor industry the biogas and methane potential has been found to be 587.5 m3/day and 352.5 m3/day respectively. Among the liquor industries only those liquor industries that have annual capacity more than 7000 kL has been found to be suitable for establishing commercial biogas plants. The highest potential has been estimated in Gorkha Brewery Pvt. Ltd. having potential of 473 m3/day. The biogas and methane potential of Nepal from vegetable market have been calculated to be 2609 m3/kg and 1957 m3/kg respectively. The maximum heat and electrical energy output have been estimated to be 239.2 kW and 179.4 kW respectively. Highest potential of biogas generation has been found in Kathmandu valley due to its high population density. For hotel industries, the total biogas potential has been estimated to be 85.1 m3/day and the maximum heat and electrical output has been found to be 7.8 kW and 2.1 kW respectively. From this study, it can be summarized that huge biogas potential lies in the sector of sugar mills and livestock. It is recommended to launch pilot project for mega size biogas plants for sugar mills and selected liquor industries like Gorkha Brewery. In addition, for livestock sector, it is suggested to install large size biogas plants, as large potential can be harnessed from several farms.

I am working as Assistant Professor and Program Coordinator of M.Sc. in Renewable Energy Engineering at Pulchowk Campus, Institute of Engineering, Tribhuvan University, Nepal. My research interest is in the field of Mechanical Engineering, Renewable Energy, and Environmental Engineering. I have published more than 50 research papers in different peer-reviewed journals and conference proceedings.

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Understanding how genes, environment and their interactions influence aging and longevity

Aging is a complex trait with clear genetic underpinnings. With a growing number of genetic aging factors in hand, the next great challenge is to describe how such cellular processes and regulatory pathways are integrated with one another and how they are affected by environmental cues. In our lab, we have developed automated tools based on robotic integration to systematically identify aging factors in the budding yeast Saccharomyces cerevisiae and to score their genetic interactions (epistasis). In this talk, I will present new insights into the gene-network wiring of aging cells, including a role of the Swr1 histone-exchange complex in post-mitotic cell survivorship and a functional link between autophagy and the Arv1-mediated lipid-homeostasis pathway. Finally, I will describe a genome-wide screen for genetic mediators of longevity by dietary restriction, underscoring the relevance of cell-cycle control as a mechanism for chronological longevity. This study provides a global view of the cellular response to a non-pharmacological intervention that extends the lifespan of organisms, from yeast to humans.

Alexander De Luna is a biologist and currently an Assistant Professor at CINVESTAV-IPN, in Irapuato, Mexico. He obtained his PhD from the Universidad Nacional Autónoma de México in 2002 and was a postdoc in Systems Biology at Harvard Medical School (2004-2008). His research focuses on genetics, metabolism, and evolution, with emphasis on biological aging. His laboratory uses model microorganisms and robotic integration to explore how genes, the environment, and their interactions influence complex cellular phenotypes such as proliferation, stress response, and lifespan.

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Years With Chemistry And Nanotechnology From Research To Life Pathway

As a scientist, I spent my life time working in chemistry and nanotechnology specifically their industrial applications hoping to play with materials to go outside the laboratories to new perspectives. Therefore, I worked with different directions and particularly nanostructured polymers and nanocomposites where through these materials I could approach several applications from construction materials, curing agricultural wastes, medical applications, drug delivery, electronics, etc. At my lecture, I will explain in a glance my journey and research activities related to my research group to employ new materials, nanostructured polymers and nanocomposites in versatile applications through different research projects. Surprisingly, after years, I found my activities turned to resemble my materials where both are dendritic and hyperbranched!

Dr. Amal is an associate professor for nanotechnology/polymers at National research center at Cairo- Egypt with large number of publications and research activities. She worked at and travelled to several countries including- but not limited to-Germany, USA, France, etc. She was cofounder and executive committee member of global and Egyptian young academies. She was president and cofounder of Egyptian society and Arab network of materials and nanotechnology. She was TWAS young affiliate and science diplomacy alumni. Now, she is advisory board member of Egyptian young academy, founding chair of women in science without boarders initiative and founding fellow of the Academy of Engineering and Technology for the Developing World (AETDEW). She was invited to Summer Davos, AAAS, WSF, INGSA conference on science and policy making in Brussels, Belgium and other big scientific high level meetings. She is especially interested in science communication, increasing public awareness/ literacy for science, science advice/diplomacy, innovation, science policy, etc.

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RyR2-Mediated Calcium Release And Mitochondrial ROS Generation Partake In The Synaptic Dysfunction Caused By Amyloid Beta Peptide Oligomers

Amyloid β peptide oligomers (AβOs), toxic aggregates with pivotal roles in Alzheimer's disease, trigger persistent and low magnitude Ca2+ signals in neurons. We reported previously that these Ca2+ signals, which arise from Ca2+ entry and subsequent amplification by Ca2+ release through ryanodine receptor (RyR) channels, promote mitochondrial network fragmentation and reduce RyR2 expression. Here, we examined if AβOs, by inducing redox sensitive RyR-mediated Ca2+ release, stimulate mitochondrial Ca2+-uptake, ROS generation and mitochondrial fragmentation, and also investigated the effects of the antioxidant N-acetyl cysteine (NAC) and the mitochondrial antioxidant EUK-134 on AβOs -induced mitochondrial dysfunction. In addition, we studied the contribution of the RyR2 isoform to AβOs -induced Ca2+ release, mitochondrial Ca2+ uptake and fragmentation. We show here that inhibition of NADPH oxidase type-2 prevented the emergence of RyR-mediated cytoplasmic Ca2+ signals induced by AβOs in primary hippocampal neurons. Treatment with AβOs promoted mitochondrial Ca2+ uptake and increased mitochondrial superoxide and hydrogen peroxide levels; ryanodine, at concentrations that suppress RyR activity, prevented these responses. The antioxidants NAC and EUK-134 impeded the mitochondrial ROS increase induced by AβOs. Additionally, EUK-134 prevented the mitochondrial fragmentation induced by AβOs, as previously reported for NAC and ryanodine. These findings show that both antioxidants, NAC and EUK-134, prevented the Ca2+-mediated noxious effects of AβOs on mitochondrial function. Our results also indicate that Ca2+ release mediated by the RyR2 isoform causes the deleterious effects of AβOs on mitochondrial function. Knockdown of RyR2 with antisense oligonucleotides reduced by about 50% RyR2 mRNA and protein levels in primary hippocampal neurons, decreased by 40% Ca2+ release induced by the RyR agonist 4-chloro-m-cresol, and significantly reduced the cytoplasmic and mitochondrial Ca2+ signals and the mitochondrial fragmentation induced by AβOs. Based on our results, we propose that A?Os-induced Ca2+ entry and ROS generation jointly stimulate RyR2 activity, causing mitochondrial Ca2+ overload and fragmentation in a feed forward injurious cycle. The present novel findings highlight the specific participation of RyR2-mediated Ca2+ release on AβOs -induced mitochondrial malfunction.

Dr. Paula-Lima is a young researcher leader in Alzheimer research, who made her career exclusively in Latin America. Her work is focused on the study of the molecular mechanisms involved in Alzheimer´s disease, investigating how amyloid beta-peptide affects neuronal calcium signaling, endoplasmic reticulum-mitochondrial functional interactions and gene expression. Her scientific experience translates into a high scientific output, with publications in prestigious journals, several presentations in international conferences and important awards, including recognitions by The Society for Neuroscience, AD/PD International Conferences Organizing Committee, The National Academy of Sciences, The Nobel Laureate Meeting Committee, TWAS and The Royal Society.

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In Vitro And In Vivo Evaluation Of Therapeutic Efficacy Of Phages Against Multidrug Resistant Staphylococcus Aureus (MDRSA)

Phage therapy is currently being considered as an alternative method of treating multidrug-resistant bacterial infections. This study sought to determine the therapeutic efficacy of environmentally obtained Staphylococcus aureus lytic phage against multidrug-resistant S.aureus (MDRSA) both in vitro and in mice. Phages and MDRSA were isolated from sewage samples collected from within Nairobi County. The isolated S. aureus bacterium was screened for resistance towards; Ceftazidime, Oxacillin, Vancomycin, Netilmicin, Gentamicin and Erythromycin, Trimethroprim-Sulfamethoxazole and Cefuroxime. Thirty BALB/c mice were randomly assigned into three groups; the MDRSA infection group (n=20), the phage-infection group (n=5) and non-infection group (n=5). After 24 or 72 hours post-infection (p.i.) with MDRSA, the infected mice were either treated with a single dose of clindamycin (8mg/kg/bwt) or 108 PFU/ml of S. aureus phage or a combination (clindamycin and S. aureus phage). Safety was determined by monitoring animal physical health p.i. as well as gross pathology and histopathology. Bacteremia was determined daily for 10 days and used to establish therapeutic efficacy of the phage. Treatment with phage was efficacious (100%) compared to clindamycin (62.25% 24hrs p.i and 87.5% at 72hrs p.i.) and combination therapy (75% at 24hrs p.i. and 100% at 72hrs p.i.). The phage treated mice had no bacteremia at day 7 post-treatment compared to those treated with clindamycin and combination therapy (P < 0.001). In addition, they had no tissue abscesses or inflammation in the brain, lungs and liver. In conclusion, S. aureus phage was efficacious against MDRSA bacterium and confirms its possibility for application in humans.

Dr. Atunga Nyachieo (Institute of Primate Research, Nairobi, Kenya) is a well seasoned senior researcher and an excellent student mentor. He successfully completed his PhD degree in Biomedical Sciences (Mechanisms of human diseases, 2010) from the University of Leuven (KULeuven, Belgium). Dr. Nyachieo also has a Masters degree (MSc, Molecular Biology; 2004) from University of Leuven; KULeuven, Belgium) and a Bachelors degree (Bsc, Biochemistry; 1999) from Jomo Kenyatta University of Agriculture and Technology (JKUAT), Nairobi, Kenya. Dr. Nyachieo is focused in his research work in understanding the mechanisms and pathogenesis of reproductive diseases/infections and disorders (endometriosis, herpes, papilloma virus etc) using animal models mainly non-human primates. He has also been involved in molecular characterization of enteric viruses especially rotaviruses. Recently he has ventured into phage therapy as alternative to antimicrobials. He strongly believes that good scientific research is the key to good and healthful life. He has numerous research publications (>35) that he has (co-) authored including a prestigious Cochrane Systematic review and presented in several local and international conferences. He has also, attracted more than ten (>10) research grants from which has enabled me to offer student projects both undergraduate and post-graduate students including: USA (University of Michigan, University of Yale, NIH); Europe (University of Leuven, Belgium); Kenya (National commission for science technology and innovation (NACOSTI)). In addition he has won five (5) main professional awards based on his career including the prestigious Belgian development co-operation prize for the best MSc thesis in 2004. He is currently a member of six (6) professional scientific societies. He is a TWAS young affiliate (2014-2018) and a member of a local organizing committee for the African Academy of Sciences (AAS). Recently, he was nominated, as a young future leader and participated in the "Science and Technology in Society Forum, in Japan (2015) where he had a chance to participate in dialogue with Nobel Laureates.

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Answer Extraction From An Academic Question Answering Site

Online discussion forums are important platforms to share information and discuss topics about any subject, thereby creating online communities. Usually post comments or questions into this community and others reply with answers or their opinion about the posted comments. The comments on a topic create a valuable source of information, thus extracting specific answers to the questions becomes vital to avoid reading every comment in the forum. This paper considers the problem of finding answers to extracted questions. A model for generating dynamic queries and patterns for questions was constructed in order to extract the answers that fit each question, and the extracted answers were inspected for accuracy. The performance of query and pattern approach in finding answers to questions and also the combined method of pattern and query was tested. The data set for the work was obtained from Research gate, an online community for researchers to share ideas, collaborate on projects and find answers to challenging issues. Questions extracted from the forum are classified into one or more answer class, the question and the forum where the questions are obtained and analyzed for the answer extraction. Experimental results show that our method was able to isolate answers for questions with high performance accuracy and precision. Also, the combined method produced a better over the individual methods.

Dr. Bolanle Ojokoh's current research interests are Intelligent information filtering and extraction and application in Recommender Systems, Digital Libraries and Question Answering Systems. She is also interested in Gender issues in Science and Information Technology. She has published up to fifty publications in reputable journals and conferences. She was awarded TWAS Young Affiliate in July 2013. She is a member of Nigeria Computer Society (NCS), International Network of Women Engineers and Scientists (INWES), Organization of Women in Science for the Developing World (OWSD), Computer Professionals Registration Council of Nigeria (CPN) and Association of Computing Machinery (ACM).

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Niche Overlap And Resource Partitioning Between Rare Topi Antelope (Damaliscus Korrigum) And Other Sympatric Bulk Grazers In Pendjari Biosphere Reserve (Northern Benin): Implication For Topi Conservation

Topi have declined considerably in West Africa, partly due to deteriorating habitat conditions and poaching. Comparative data for the nutritional and competition are however lacking. We aimed to understand whether resource availability and use in coexisting system may promote rarity of topi antelope in PBR. We used observations and stable isotopic composition of faeces data to determine whether remaining rare topi antelope population in the PBR experience competition and nutritional stress with sympatric bulk grazers. We find little evidence for diet niche overlap between rare antelope with bulk grazing species. This partitioning of resources (interpreted mainly as tall- versus short-grass grazing, respectively) is consistent with reported differences in observed diet, and comparative oral morphology. Last, we find less seasonal diet variations amongst bulk grazers feeding in rare antelope habitats compared with other landscapes. We propose that loss of functional heterogeneity, apparently brought about by high densities of artificial waterholes, limits recovery of diet- and habitat-selective topi populations in Pendjari.

Dr Djagoun Chabi is a lecturer at the School of Environment Management, Faculty of Agronomy Sciences, University of Abomey-Calavi. He is also the coordinator of the African Wildlife Conservation and Management Unit for the International Union of Forest Research Organization (UIFRO). He is specialised in the field of wildlife conservation biology and has a great expertise in the application of stable isotope ecology on the construction, parameterization, analysis of wildlife population and community ecology models.

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Mitigation Of 3-monochloropropane-1,2-diol And Glycidol Esters In Refined Palm Oil Via Modified Refining Process

The presence of 3-monochloropropane-1,2-diol esters (3-MCPDE) and glycidyl esters (GE) in refined oils is an important safety issue in the edible oil industry. The safety of refined palm oil plays a pivotal role in meeting consumer demands for high-quality finished food products. Investigation of the formation of 3-MCPD and GE and modification of the refining processes used in the production of refined palm oil are two tasks that are key to maintaining the status of palm oil as the most widely consumed vegetable oil in the world. This paper reviews and discusses the formation 3-MCPDE and GE during the physical refinement process of palm oil, including the analytical aspects, processing factors and related precursors that contribute to their formation, for the mitigation of 3-MCPDE and GE during the refinement process. D-optimal design was utilized to evaluate the factors that contribute to the formation of ME and GE in the palm oil physical refining process, particularly during the degumming and bleaching stages. Crude palm oil quality parameters were also assessed to determine whether its minor components are putative precursors for ME and GE formation. Water degumming effectively reduced the ME content up to 50%. However, this was not the case for GE. Acid-activated (AA) bleaching earth demonstrated a greater effect on ME reduction compared with natural bleaching earth, indicating that the performance and adsorption capacities of bleaching earth are prominent factors in ester removal. To produce an refined palm oil with reduced levels of ME and GE, physical refining processes were modified and optimized using response surface methodology to manipulate four processing parameters: phosphoric acid dosage, degumming temperature, bleaching earth dosage and deodorization temperature under micro lab-scale refining processes. The optimized conditions were 0.31% phosphoric acid at a degumming temperature of 50°C, 3% AA bleaching earth and a deodorization temperature of 240°C. This modification enabled 82.5% and 88.6% reductions in ME and GE contents, respectively, in the final refined palm oil obtained.

Prof Tan is currently heading the Department of Food Technology, Faculty of Food Science and Technology, UPM. He is also the Program Leader for Fats and Oils Technology, specializing on palm oil, lipid technology, food nanotechnology, food emulsion and extraction of bioactive compounds from various agricultural by-products. He has also provided research-based consulting advice to a range of food companies and the Food Quality and Safety Division of the Ministry of Health, Malaysia. Prof Tan also assesses food safety issues related to various lipid-based products. The quality and safety of various heated oils and processed contaminants in oil products are his main research focuses in this area. To date, he has published one joint-edited book, ten book chapters and over 250 scientific articles in peer-reviewed journals, has filed more than 15 patents and has presented more than 250 papers at various national and international conferences.

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Functional Studies Of The BiP Chaperon Protein And His Role In Protein Translocation

The effect of force on protein structure and associated changes of protein function is a subject of current intensive research. Recent technological advances now allow the application and measurement of forces on biomolecules with extreme precision. In this study we used the optical tweezers (OT) to study the BiP protein (Immunoglobulin Binding Protein). BiP is a member of the Hsp70 chaperones that participates in translocation and protein folding in the endoplasmic reticulum. The function of BiP relies on cycles of ATP hydrolysis driving the binding and release of its substrate proteins. It still remains unknown how BiP affects the protein folding pathway and it has not been directly demonstrated to which folding state of the substrate protein it binds. Using the protein MJ0366 as a substrate for BiP, we performed pulling-relaxing cycles at a constant velocity to unfold and refold the protein substrate in order to determine how BiP affects the folding mechanism of a protein and how this effect depends on nucleotides. In the absence of BiP, MJ0366 unfolded and refolded in every pulling cycle. However, when BiP was added the frequency of folding events of MJ0366 significantly decreased. This process was dependent on ATP and ADP. As ATP decreased or ADP was added BiP stayed bound to MJ0366 for longer periods of time. This in turn led to a decrease in the frequency of unfolding and refolding events. BiP-ATP has higher off rates for substrate binding than BiP-ADP, and that is has a higher affinity for the substrate when bound to ADP compared to ATP. Therefore, we conclude that BiP binds to the unfolded state of MJ0366 and prevents its refolding and this effect is dependent on both, the type and concentration of nucleotides. Also we will show our progress in understanding translocation at single-molecule level. FONDECYT-11130263, PCIPII20150073.

Dr. Christian A.M. Wilson was trained as a Biochemist and obtained his Ph.D. from the University of Chile, Chile in 2011. Doctor Wilson performed a postdoctoral training at University of California, Berkeley, USA with Dr. Carlos Bustamante and Dr. Susan Marqusee (2011-2013). He then joined the Faculty of Chemistry and Pharmaceutical Sciences at the University of Chile in 2013, where he is currently an Assistant Professor at the Biochemistry and Molecular Biology department. His laboratory focuses in single molecule manipulation of biomolecules. Now, their work is focused in determining the importance of the force associated to the domain movements of BiP (immunoglobulin heavy-chain binding protein) protein during protein translocation in the ER, also focusing in the kinetic properties of BiP and in the conformational changes that occur during its ATPase cycle, as it is working in the translocation process. Dr. Wilson lab has assembled the first optical tweezers instrument to measure force in individual molecules in the country.

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Pharmacogenomics: A Primer For Precision Medicine In Africa

Africa faces a quadruple burden of disease with cutting across both communicable and non-communicable diseases types. Infection with the human immunodeficiency virus (HIV/AIDS), tuberculosis (TB), malaria and disease causing high mother-infant mortality rates, pose a huge challenge in Africa meeting the WHO sustainable development goals. If the rising burden of cancer and diabetes is included, the picture that is formed is that of a desperate continent and its people. Many of these disease conditions require drugs for their treatment and management. Drug discovery involves experimentation that includes humans until a drug is certified ready for release. Most human studies on drug discovery and development have often included Caucasian and Asian populations and very little or no African populations. Thus, knowledge obtained is not always applicable to African populations. Besides, involvement of people in drug discovery studies can be viewed as testing the effects of underlying genetics to drugs response. As human being originated from Africa, so is the genetic diversity highest in this continent.

This presentation will explore the genetics of African populations, its diversity including how it also encompasses the genomics of those populations outside of Africa. Pharmacogenomics (the science of how one's inherited genetics affects drugs response) would help identify and catalogue variations in genes which makes some drug combinations function well or those which enhance other drugs. We will present data on the pharmacogenomics of antiretroviral therapy (ART), cancer and warfarin. The data shows that that African populations are the most genetically diverse, are most affected by diseases and could benefit much more than other populations in terms of precision medicine which ultimately reduces drug adverse effects. This presentation will show how technological advances in genomics research will have a profound effect on the health of world populations. We will demonstrate using antiretroviral therapy, the possibilities of coming up with pharmacogenomics tests to assist in drug dosages as part of the components of precision medicine.

Professor Collet Dandara is the Principal Investigator of the Pharmacogenomics and Drug Metabolism Research Group at the University of Cape Town. His research focusses on human genetics variation particularly the genetic basis of differences in the way patients respond to same treatment. In addition, he is also passionate about finding variations in genes that determine genetic susceptibility to disease. Lastly, the third arm of his research evaluates the interaction between medicinal herbs and conventional medication. Is a TWAS TYAN Exco member, an Exco member of IUPHAR pharmacogenetics section and Interim Chair of the African Consortium of Pharmacogenomics (ACP)

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A Novel Sandfly-borne Phlebovirus From East Africa

Arboviral diseases constitute a significant proportion of emerging and re-emerging infectious disease burden worldwide demonstrated by outbreaks of Zika, Dengue, and Yellow fever. As is the case in much of Africa, infections by the causative agents of these diseases often go unnoticed and sometimes misdiagnosed as malaria due to similarity in febrile clinical presentation. Under these circumstances, detection of novel and known arboviruses or variants not previously recognized remains plausible, many of which the public health burden and public health significance remains obscured. As part of our continued efforts for surveillance of arboviruses in Kenya, this presentation will highlight the zoonotic potential of a new sand fly-borne phlebovirus, supported by several lines of evidence including vector virus isolation, serology, whole genome sequencing and phylogenetic analyses, pathology in mice and the virus susceptibility in cell lines from a broad range of mammalian hosts. Most interestingly neutralizing antibodies were detected in human serum samples from the same place where the sandflies were collected. Our data show that previously unknown human pathogenic arboviruses are circulating in East Africa.

David is a vector ecologist working on mosquito and sandfly vectors of malaria and arboviral diseases. He combines a range of skills varying from chemical and behavioral ecology, population genetics and arbovirology to gain insights into vector-pathogen-host interactions towards identifying weak links for control and through the development of biocontrol methods (semiochemical-based) for vector surveillance and epidemiological investigations.

Emeka Oguzie

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Biomass Extracts Inhibit Metal Corrosion

Our ongoing research project is tagged "Natural Products for Materials Protection" (NPMP), and is related to the inhibition of corrosion of iron and steel surfaces exposed to an aqueous aggressive medium by natural products. Specifically, this project focuses on the systematic investigation of some plant extracts as potential sources of benign corrosion inhibiting additives for iron and steel and involves introduction of the extract into the aqueous aggressive medium in order to bring the inhibitor into contact with the surface to be protected. This study is necessitated by the high costs and toxic nature of most common inhibitors and the need to develop a new class of corrosion inhibitors with low toxicity and good efficiency. We herein present some of our findings employing electrochemical a.c. (impedance) and d.c. (polarization) techniques to study the corrosion inhibiting effects of three tropical plant species Moringa oleifera (MO), Mimosa pudica (MP), Dacryodes edulis (DO) on the acid corrosion of low carbon steel. Impedance measurements revealed that the steel dissolution process was under activation control and all the extracts inhibited the corrosion process by virtue of adsorption. Potentiodynamic polarization data indicate that the extracts mostly behaved as mixed-type inhibitors. The inhibitive actions of the plant extracts have been discussed on the basis of adsorption of protonated and molecular species of the extracts on the corroding steel surface. Density functional theory-based molecular dynamics (MD) simulations were performed to illustrate the adsorption process of the active species of the extracts at a molecular level and the theoretical predictions showed good agreement with the electrochemical results.

Emeka Emmanuel Oguzie is a Professor of Chemistry at the Federal University of Technology Owerri (FUTO) and leads the multidisciplinary Electrochemistry and Materials Science Research Unit (EMRU: www.emrufuto.com). Prof. Oguzie's research interests span the areas of Electrochemistry/Electrochemical Technology; Environmental Remediation and also Environmental & occupational Hazards Management. His research group EMRU-FUTO is known worldwide for groundbreaking research in metal corrosion and protection. He has made outstanding pioneering contributions in the development of non toxic, environmentally friendly anticorrosion additives from biomass extracts. He is currently Director, Center for Research & International Development, FUTO.

Emmanuel Unuabonah

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Highly Efficient Removal Of Enteric Bacteria From Water With Hybrid Clay Composites

This study reports the preparation of new metal-doped hybrid clay composite adsorbents: Kaolinite clay + carica papaya seeds + ZnCl2 (PS-HYCA), Kaolinite clay + plantain peels (Musa paradisiaca) + ZnCl2 (PP-HYCA) and Kaolinite clay + carica papaya seeds + plantain peels + ZnCl2 (PS-PP-HYCA) for the removal of gram-negative enteric bacteria: S. typhi and V. cholerae from water. The breakthrough times for the removal of 1 x 10^8 cfu/mL of each of S. typhi and V. cholerae from water for PP-HYCA, PS-HYCA and PP-PS-HYCA composite adsorbents was 400, 700, 275 min for S. typhi; and 400, 400, 200 min for V. cholerae respectively. All three composite adsorbents kept the levels of bacteria in solution far below alert/action levels of ca. 500 cfu/mL. At 10^3 cfu/mL of each bacterium in solution, 2 g of both PS-HYCA and PP-HYCA composite adsorbents maintained bacteria in effluent solutions at zero for up to 20 h at a flowrate of 8 ml/min. Steam regeneration of bacteria-loaded adsorbents (10^8 cfu/mL) was effective even after the 3rd regeneration cycle. This composite adsorbent is comparatively of good performance and shows a relatively long hydraulic contact times and is expected to minimize energy intensive traditional treatment processes.

Scientific Expertise: Dr Emmanuel Unuabonah is an Associate Professor in the Department of Chemical Sciences, Redeemer's University, Nigeria. He leads the Environmental and Chemical Processes Research (E&CPR) group. His research work focuses on development of functional materials for treatment of water. His research has attracted several grants and he is well published. He has received several travel grants, prestigious awards and research fellowships in recognition of his research work.

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Photostabilizing Efficiency Of Poly(vinyl Chloride) In The Presence Of Organotin(IV) Complexes As Photostabilizers

Three organotin complexes containing furosemide as a ligand (L), Ph3SnL, Me2SnL2 and Bu2SnL2, were synthesized and characterized. Octahedral geometry was proposed for the Me2SnL2 and Bu2SnL2, while the Ph3SnL complex has trigonal bipyramid geometry. The synthesized organotin complexes (0.5% by weight) were used as additives to improve the photostability of poly(vinylchloride), PVC, (40 m thickness) upon irradiation. The changes imposed on functional groups, weight loss and viscosity average molecular weight of PVC films were monitored. The experimental results show that the rate of photodegradation was reduced in the presence of the organotin additives.

In addition, the atomic force microscope images for the PVC films containing Ph3SnL2 after irradiation shows a smooth surface compared to the controlled films. The rate of PVC photostabilization was found to be highest for Ph3SnL followed by Bu2SnL2 and Me2SnL2. It has been suggested that the organotin complexes could act as hydrogen chloride scavengers, ultraviolet absorbers, peroxide decomposers and/or radical scavengers.

Emad Yousif Al-Sarraj graduated from Baghdad University, Iraq, in 1996 with a B Sc in chemistry. He then transferred to Al-Nahrain University, also in Baghdad, to study for his M Sc and Ph D, and graduated in 1998 and 2004, respectively, with a focus on inorganic chemistry. In 2004, Al-Sarraj took up a post as lecturer at Al-Nahrain University, and was promoted to assistant professor in 2008 and to Professor in 2015. Al-Sarraj's research covers the inorganic, photochemistry, synthesis, structure, processing and properties of polymers,. In particular, he is interested in the photochemical, optical and lubricant properties of such polymers. Al-Sarraj has published many scientific articles in national and international journals which reflect his interest in public engagement in science and In the field of safety, Security and ethics of chemistry In addition, based on his international publications, he has recently been honored by the Government of Iraq with the prestigious in 2010, 2011, 2012, 2013, 2014 and 2016 Science Day Prize.

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The Dynamics Of Antibiotics And Antimicrobials In Reservoirs: Ecological And Public Health Risk

Antibiotic resistance constitutes health issues that have immense consequences on mankind, simultaneously affecting several settings such as humans, animals and natural environments. The overuse of antibiotics in veterinary medicine is believed to have led to the spread of resistant strains to soil habitats and from there on to food plants. As plant foods such as vegetables may be eaten raw, there is a risk of further foodborne transmittance of such resistant strains that originate from animal sources on to humans. Antimicrobial resistance is a prime example of a model of health threats, in which understanding the central role of the environment is crucial to managing the potential risks. Also, the increasing incidence of emerging and re-emerging antibiotic resistant microbial pathogens in different reservoirs has become imperative. This paper deals with different antibiotic residues and antibiotic resistance genes dissemination among relevant reservoirs and assessing how these events contribute to the present situation of antibiotic resistance. The connection between the spread of resistance and the involvement of different genetic elements and mobile resistance genes spread across different niches highlight the attendant risks. Calls for measures to combat antimicrobial resistance and associated challenges are addressed.

Prof. Etinosa Igbinosa research focuses on wastewater / water quality, novel metabolites from microbial natural products. His current research is on foodborne pathogen as these bacteria are causative agents of foodborne infection (e.g., Salmonella, ETEC, EHEC/VTEC, Vibrios, Listeria). A specific emphasis is on the antibiotic resistance, resistance genes mechanism and virulence gene expression of bacterial pathogens. The bacteria are characterized and identified to genetic lineage level, with the aim of significantly contributing towards consumer health protection. Prof. Igbinosa is currently a senior Humboldt Fellow at Max Rubner Institut, Kiel Germany and a Fellow of the Africa Science Leadership Programme (ASLP) at the University of Pretoria, South Africa.

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Evolutionary Origins Of Stem Cells

Only some animals have the capacity to propagate clonally by budding and form colonies. Within the chordates, tunicates (the sister group of vertebrates) are a marine group of invertebrate animals that have evolved multiple times independently solitary species that reproduce only sexually, or colonial species that reproduce both asexually and sexually. We have undertaken a comparative and multidisciplinary approach to link cellular and molecular understanding of development to macroevolutionary events. We hypothesize that the ability to reproduce clonally by budding is related to the remarkable potential of regeneration in tunicates and a high evolvability in the mechanisms that regulate adult stem cell development. We compared budding mechanisms in three colonial (i.e. Botryllus schlosseri, Symplegma brakenhielmi, Polyandrocarpa zorritensis) and one solitary species (i.e. Styela plicata) of the same tunicate clade (i.e. Styelidae). All colonial species differed in budding modes, blood cell types, and in the degree of integration and/or synchronization of developmental modules, whereas S. plicata presented a high regenerative potential mediated by circulatory progenitor cells. Similarities and differences in progenitor cells and tissues involved in regeneration or developmental processes of budding among the three colonial species have allowed us to identify potential developmental mechanisms responsible for the evolution of coloniality in this group. To understand genomic changes during the transitions to asexual reproduction, clonality, and coloniality, we sequenced and continue to assemble the genomes of several colonial species of tunicates. We are specifically interested in how ncRNAs may have played a role in the regulation of progenitor cells involved in budding and asexual reproduction. We have already found a pool of candidate miRNAs and other ncRNAs that are overrepresented in the genomes of colonial species that need additional validation and further experimentation in developmental studies.

I am interested in the evolution of developmental processes and behaviors of organisms. In particular, I am currently studying the evolutionary origins of stem cells and tissues involved in animal regeneration and budding, and the neural and genetic changes that occur during the evolution of behaviors. We are exploring evolutionary changes in different animals using comparative approaches at the genomic, cellular, and organismal levels. As laboratory model species, we are currently studying ascidians, flatworms, and roundworms.

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Sequence Of Immune Response In Non-cerebral And Cerebral Experimental Malaria

Malaria is an infectious parasitic disease caused by protozoa of the genus Plasmodium that can result in uncomplicated or severe disease, such as the clinical form known as cerebral malaria. Given that the malaria parasite is not neurotropic, neurological sequel is a consequence of a neuroinflammatory response triggered by an unbalance between pro- and anti-inflammatory immune response. Innate cells represent the first line of defense, by producing inflammatory mediators that amplify the innate immunity and shape the development of adaptive response against the pathogen. We investigated the differences in recruitment and differentiation of innate and adaptive cells to the spleen of Plasmodium-infected mice, which might explain the outcome of the disease. Myeloid and lymphoid populations were analyzed by flow cytometer at different time points following i.p. inoculation of GFP-expressing Plasmodium berghei ANKA- parasitized red blood cells into BALB/c and C57BL/6 mice, experimental models of non-cerebral and cerebral malaria, respectively. While most C57BL/6 developed cerebral malaria and died at day 7 post-infection, the course of parasitemia was the same until day 6, in both animals. Interestingly, BALB/c mice presented a sharper increase in the total number of leucocytes in the spleen when compared C57BL/6 mice. Between the subpopulations of CD11b+ myeloid cells retrieved from the spleen, we observed an influx of neutrophils and inflammatory monocytes between 1 and 4 days. The expansion of B cells was observed in both animals, from the 4th day post-infection and, again more pronounced in animals BALB/c. CD4 and CD8 T cells also increased in numbers in the spleen of BALB/c animals after infection. Although at different proportions, the expansion of CD4 and CD8 T cells in C57BL/6 animals was also observed. This study shows a detailed dynamic inflammatory process, what is important to understand the early events of the immune response during cerebral malaria.

Flávia Ribeiro-Gomes was graduated in Biological Science from the State University of Norte Fluminense (UENF), Brazil, in 1997, and received a Master degree in Biosciences and Biotechnology from the same university. During the academic year of 2001-2004 as a doctoral fellow at the Federal University of Rio de Janeiro (UFRJ), she demonstrated how the interactions of dead inflammatory neutrophils with macrophages regulate Leishmania major infection.

Because of her expertise in studying parasite-host cell interactions, Dr. Ribeiro-Gomes joined the Laboratory of Parasitic Diseases, NIAID, NIH (2007-2013). During this time, her work produced the most comprehensive analysis to date of the sequence of inflammatory cell recruitment and infection in the skin. She also made the key discovery that rapidly recruited neutrophils are the first cells to phagocytose Leishmania promastigotes in the skin, and that infected, apoptotic neutrophils are themselves taken up by dermal dendritic cells via a process that strongly inhibits DC activation and T cell priming. Her findings have important implications for other vector borne pathogens for which the acute inflammatory reaction to the bite of the arthropod vector might also inhibit the onset of the adaptive immune response.

In 2013, Dr. Ribeiro-Gomes returned to Brazil for new challenges and to improve science in her country. She assumed the position of Public Heath Researcher at FIOCRUZ, to conduct basic and applied research on the prevention, control, and treatment of malaria, disease of global importance. Her work has been largely directed toward the identification of immunological targets for disease intervention.

Franco M. Cabrerizo

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βCarboline Alkaloids: Photosensitizing Properties And Biotechnological Applications

The presence of β-carboline (βC) alkaloids has been confirmed in a vast range of phylogenetically distant species, i.e., Rhizaria, Alveolata y Amoebozoa (protists organisms), Stramenopiles (including unicellular diatoms and blue-green algae organisms), Opisthokonta (a monophyletic clade including both the animal and fungus kingdoms, together with the eukaryotic microorganisms grouped in the paraphyletic phylum Choanozoa), Archaeplastida (green and red algae, land plants, etc.), Urochordata (ascidians) and Arthropoda (insects, arachnids, etc.).

These compounds are of great interest due to their antitumor and antimicrobial activity. The mode of action and the multiple cellular targets affected by these drugs might contribute to prevent the appearance of resistant microbial strains. βCs are also quite efficient photosensitizers. Upon UVA photoexcitation, these alkaloids are able to photo-induce damage on biologically relevant macromolecules, as well as to inactivate bacteria and viruses. The combination of chemo- and photodynamic therapies represents an effective treatment to inactivate different class of microorganisms.

In this context, we study the molecular bases of those processes triggered by light where βCs alkaloids are involved. The study and full characterization of the photophysics, photochemical and photosensitizing properties of βCs provide useful tools to further explore different biotechnological applications in: health (development of conjugates for drug-targeting in photodynamic therapy of cancer and development of photodynamic attenuated anti-Toxoplasma gondii vaccine), food production (in the control of phytopathogenic fungi that causes post-harvest diseases in fruit and vegetables) and energy (in the search of pigments from natural sources for the development of low-cost dyes-sensitized solar cells).

Dr. Cabrerizo received a Bachelor degree in Chemistry (2002) and a Ph.D. degree in Science (2005) from National University of La Plata (Argentina). He is currently a research member of CONICET (Argentina). His research activities are framed in different fields of knowledge such as Organic Chemistry, Physical Chemistry, Photochemistry and Photobiology.

As the head of the Photochemistry and Molecular Photobiology Research Group, at IIB-INTECH (CONICET - UNSAM), his current research focuses on understanding the molecular aspects of mechanisms underlying the processes triggered by UVA and visible light. This knowledge provides valuable information for the development of different biotechnological applications that might contribute to attend unresolved relevant local and global problems related to some infectious and chronic diseases as well as to changes in the current energy matrix towards more sustainable and renewable sources of energy.

As an Associate Professor at National University of San Martín (UNSAM) Dr. Cabrerizo teaches General Chemistry and Organic Chemistry for undergraduate and postgraduate students.

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Prevalence Of Resistant Escherichia Coli Isolated From Pasteurised Cow Milk And Its Related Samples In The Tamale Metropolis Of Ghana

Escherichia coli are mostly commensals but few are pathogenic and harbour the intestinal tracts of cattle and humans. This study was carried out to determine the prevalence of resistant Escherichia coli isolated from pasteurized cow milk, cow milk products and hands of cow milk sellers.

The conventional method and the disc diffusion method were used for the isolation and antibiotic resistance of Escherichia coli, respectively.

The overall prevalence of Escherichia coli was 42.7% (128/300). Screening of 102 Escherichia coli isolates for their susceptibility to antibiotics revealed that 49.0% were susceptible, 31.0% were resistance and 20.0% exhibited intermediate resistance. Resistant to ampicillin (65.7%) was the highest, followed by erythromycin (61.8%) and tetracycline (46.1%). The Escherichia coli isolates were highly susceptible to ciprofloxacin (88.2%), gentamicin (71.6%), chloramphenicol (58.8%), sulphamethoxazole/trimethoprim (58.8%) and ceftriaxone (54.9%). The Escherichia coli isolates also exhibited forty (40) antibiotic resistant patterns with the pattern E (erythromycin) being the commonest. Twenty nine (28.4%) were resistant to three different classes of antibiotics, 20 (19.6%) were resistant to four different classes of antibiotics, 5 (4.9%) were resistant to five different classes of antibiotics and 1 (1.0%) were resistant to six different classes of antibiotics.

The study revealed that milk and its related samples sold in the Tamale metropolis are contaminated with Escherichia coli which are resistant to a number of antibiotics.

This study create the awareness that some milk, milk products and hands of milk sellers in the Tamale Metropolis are contaminated with Escherichia coli which are resistant to some antibiotics. Therefore, consumers of milk in this metropolis are at risk of Salmonella infection.

Dr. Frederick Adzitey is a senior lecturer with the Department of Animal Science, Faculty of Agriculture, University for Development Studies (UDS), Tamale Ghana. He holds a BSc in Agriculture Technology, MSc in Meat Science and Technology and PhD in Food Safety. His scientific research covers a broad range of topics, including animal and meat science, food quality and safety, antibiotic resistance and molecular characterization of foodborne and waterborne pathogens. He is currently a member of TWAS Young Affiliate, a member of Ghana Young Academy and a fellow of Science and Technology for Society (STS, Tokyo, 2015).

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Weakly-bound Molecules Obtained By Laser-association Of Cold Atoms, And The Analysis By The Vibrational Quantum Defect

In the context of cold molecule physics, spectroscopic data and their analysis play an important role, in particular to find efficient processes which end in a molecular ground state. The laser-photoassociation of cold atoms which creates molecules in an excited state is a starting process in the route to ground-state molecules. Applied to alkali dimers the photoassociation-spectroscopy has provided high-resolution data for vibrational levels lying close to the dissociation limit, which are useful in this context.
To identify the relevant coupling between molecular potentials, which determine the main routes to form molecules we have investigated the spectrum analysis by the so-called vibrational quantum defect (VQD). This quantity issues from the analogy between the Rydberg law for atoms and the LeRoy-Bernstein one for molecules. VQD-graphs can be deduced from spectroscopic data and in case of coupling between molecular potentials, they exhibit resonances that can be modelled, measured and used to characterize the coupling.
To present the VQD method, I will first introduce lasers-cooling techniques and the photoassociation spectroscopy. Then I will focus on the use of the VQD method and the extension to the rotational constant analysis.

Haikel JELASSI received the B.Sc degree in Physics from University of Tunis El Manar in 2002. Awarded as the first range student, he obtained the Tunisian government fellowship for master degrees and PhD studies in France. He obtained his Master diploma in atomic physics and lasers in 2003 and then his Phd in 2007 from the University Of Paris XI (Orsay-Paris). Between 2006 and 2009, he was in post doc positions in different French laboratories in Paris and Toulouse. In 2009, he becomes an assistant professor in CNSTN. He obtained its supervising diploma from the University of Tunis El Manar in 2014. In 2015, he becomes an associate professor in Nuclear and atomic physics .Dr Jelassi is interested on many research fields in fundamental as well in applied physics. He's interested also in the research reactors and plasma Tokomak reactors. He has authored more than 15 scientific articles in peer-reviewed journals, as well as one patent. He has supervised two PhD students and 4 undergraduate students. He's also active through the Tunisian Physical Society in there he acts as a member of the national board. He organized several conferences and workshops probing several scoop for the North African and Arab regions. Dr Haikel JELASSI is a member of two editorial board of two journals of physics. He's regularly asked to review papers for publications in peer-reviewed journals.

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On Switched Hybrid Dynamical Systems: Stability And Simulation

This presentation concerns different aspects of research on stability and simulation of switched hybrid systems. Applications are done in the fields of control and circuit theory.

Hassane Bouzahir obtained his Ph D in Applied Mathematics and his Masters in Dynamical Systems from a well internationally ranked university in Marrakech-Morocco, respectively in 2001 and 1997.
His publications include 1 research book, 1 book chapter, 18 entries in the Mathematics databases MathScinet or Zentralblatt MATH, some other articles in Analysis, Control, Modeling and Simulation in Divers Problems in Energy, Information Technology Journals and the IEEE Digital Library, a co-authored book proceeding of an IEEE International Conference and more than 30 refereed articles in proceedings of conferences. His vita lists also more than 40 talks worldwide.

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Modeling The Growth Of Listeria Innocua And Spoilage Bacteria In Cooked Tuna Loins

Tuna loins are widely consumed in Mauritius due to their low cost and high protein content. However, tuna naturally harbours spoilage bacteria and occasionally the pathogen Listeria monocytogenes. Growth of L. monocytogenes and spoilage microbiota are both affected by temperature. During storage, distribution and retailing, tuna loins are exposed to a wide range of temperatures, which can impact on the quality and safety of the product.

The purpose of this research was to develop mathematical models to predict the growth kinetics of spoilage microbiota and L. monocytogenes in tuna meat under isothermal conditions.

Briefly, cooked tuna loins were cut in pieces (12 g) and inoculated with L. innocua ATCC 33090, surrogate of L. monocytogenes, to a final population density of ca. 2 log cfu/g and stored at 2, 4, 7, 10, 13 or 15°C for up to 120 days. Un-inoculated tuna loins were stored under similar isothermal conditions. At specific time intervals, inoculated and un-inoculated samples were removed and the counts of L. innocua and total aerobic bacteria were determined by plating on PALCAM and Plate Count Agar respectively and incubating the plates for 2 days at 35°C. Growth data were then fitted to the Baranyi and Roberts model and parameters (maximum specific growth rate (μmax), asymptotic cell number (ymax) and lag time (tlag) subsequently extracted. Secondary models were then generated by plotting the log of μmaxas a function of their corresponding temperature.

Primary models were found to fit the data with a reasonable goodness of fit, with R2 values ranging from 0.916 to 0.968. Secondary models displayed a linear relationship between log μmax of L. innocua and aerobes and growth temperature (R2 of 0.912-0.955). Models developed in this study may be useful tools to predict growth responses of pathogenic and spoilage bacteria in tuna products once validated.

Hudaa Neetoo is currently a Lecturer in Microbiology at the Faculty of Agriculture of the University of Mauritius. She holds a BSc (Hons) degree in Biochemistry from Imperial College London and a Masters and PhD in Food Science from the University of Delaware, U.S. Her scientific interests are in the field of Food and Environmental Microbiology, spanning a wide range of topics. She has supervised more than 35 BSc students and has authored more than 40 scientific articles in peer-reviewed journals, as well as six book chapters. She has taught a wide range of courses, ranging from Food and Environmental Microbiology, Biochemistry, Microbial Ecology and Epidemiology among others.

Jalila Ben Salah Abbes

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Ability of Lactobacillus Plantarum mon 03 To Adhere To Caco-2 Cells In Vitro And To Mitigate AFB1 Intestinal Cells Damage In Vivo

Aflatoxin B1 (AFB1) is a toxic fungal metabolites to humans and animals, widely found as cereal contaminants in various types of food and feed. In most reported findings, the toxic effects of the AFB1 were commonly evaluated in physiological and immune system organs. However, there are a few data in the literature regarding the adverse effects of this toxin on the gastro-intestinal tract. Therefore, in the present study we tested the Lactobacillus plantarum MON03 (LP) gastric acidity tolerance and its ability to adhere Caco-2 cells in vitro. In vivo we evaluated its preventative effects against AFB1-induced intestinal cells alterations in mice.
LP was able to tolerate gastric acidity, have strongly hydrophilic cells surface properties, and adhere efficacy to Caco-2 cells in vitro. The in vivo study was conducted using Balb/c mice that received by oral gavage vehicle (control), LP only (2x109 CFU/L,~ 2 mg/kg BW), AFB1 alone (100 µg/kg BW), AFB1 + LP for 15 days. Compared to control mice, treatments with AFB1 showed a significant decrease of DNA fragmentation and expression alterations of p53, bax and Bcl-2 mRNA in cells of small intestine. Co-treatment with LP strongly reduced the adverse effects of AFB1 in all studied parameters. Moreover, the bacteria alone had no adverse effects in the mice.
In conclusion, LP by itself was 'safe', and can be considered in biotechnological processes that have a major goal of mycotoxin detoxification and Gastro-intestinal tract prevention.

Dr. Jalila Ben Salah-ABBES is an assistant professor and member of Food Safety, Food Toxicology & Contaminants Research Group at the Laboratory of Genetic, Biodiversity and Bio-resources valorization, higher Institute of Biotechnology of Monastir, University of Monastir Tunisia. She has a great interest in the safety of food and feed supply in Tunisia and her research reach to other nations with similar challenges by using additive agent in order to prevent animals against mycotoxin toxicities. Recently, she used a probiotic bacterium for mycotoxin detoxification. Actually, she sharing information about the use of probiotic in the area of toxicology, it's a safety bacterium useful in environmental health.

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Biochemical And Proteomics Responses In Mediterranean Crab: Effective Tools To Evaluate The Toxic Effects Of Marine Contaminants

Marine organisms in polluted ecosystem, develop various physiological and biochemical strategies facing the toxicities of chemicals pollutants. Many biochemical techniques have been developed in the last decade to monitor marine pollution. The biochemical endpoints such as catalase, acetylcholinesterase (AChE) and glutatione S-transferase (GST) and lactate dehydrogenase (LDH) activities; and lipid oxidation (MDA) and metallothioneins (MT) levels can provide valuable information regarding the working mechanism of toxic compounds in sentinel organism and be used as a usefulness tool (Biomarkers) for ecotoxicological assessments. These biochemical parameters were measured in Mediteranean Crab (Carcinus maenas) collected at contaminated stations of Monastir Bay and from control station. Results revealed differences among sites in relation to each specific biochemical parameter. Based on Integrated Biomarker Response (IBR), the highest values and critical biochemical alteration were observed at stations receiving urban and industrial discharges and the lowest IBR value was found at reference site. The current study has shown clearly that biochemical parameters are a usefulness tools in the monitoring marine contamination. The search of new biochemical biomarkers with a highly robust performance in different environmental conditions environmental proteomics fulfills these requirements. The proteomics approach was used to assess the toxic effects of contaminants in the Mediterranean crab (Carcinus maenas) after transplantation into fishing harbour. Nineteen proteins with significant expression differences were identified by ESI-MS/MS and homology search on data bases. Differentially expressed proteins were assigned to five different categories of biological function including: (1) chitin catabolism, (2) proteolysis, (3) exoskeleton biosynthesis, (4) protein folding and stress response, and (5) transport. These proteins may be considered as novel biochemical biomarkers for effectively biomonitoring marine environment contamination.

Dr Jamel JEBALI is a currently an Associate-Professor of Biochemistry and Environmental Toxicology at the Higher Institute of Biotechnology of Monastir (Tunisia). His research interest focus on the development of sensitive biochemical and proteomic tools for assessing the biological effects of chemical compounds in marine organisms.

John Fredy Barrera Ramírez

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Data Protection Using Optical Encryption

Data protection is a field of permanent interest, given the ever increasing flows of information in modern societies. Several methods have been proposed to secure data; among which we find optical techniques. The power of light has come into play in this research field with a refreshing, yet inspirational, point of view, bringing novel tools to generate new security concepts. Optical system exhibits many degrees of freedom (phase, polarization, wavelength, angular momentum, etc.) which allow the generation of fast and secure systems. During the last few years, optical encryption has achieved great development. This work presents an overview of the potential, recent advances, and challenges of optical encryption focused in the work developed by my group and my collaborators.

Prof. Dr. John Fredy Barrera Ramírez has received the international award "ICO/ICTP Gallieno Denardo Award 2014" given by the International Commission for Optics and the International Centre for Theoretical Physics. He has been selected as "Future Leader 2016" in the Science and Technology in Society (STS) Forum, Young TWAS Affiliate, Junior Associate of the International Centre for Theoretical Physics, and OSA Senior Member of the Optical Society. His research interests include optical information processing, optical encryption and validation, diffractive optics, holography, interferometry, and optical vision.

Luna Kamau

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Unconventional Approaches To Mosquito Control: Interference With Male Mosquito Fertility

Anopheles gambiae mosquitoes are among the most important vectors of malaria in subtropical Africa. Challenges in malaria control, including the widespread development of insecticide resistance, have stimulated the exploration of what are considered "unconventional" malaria control strategies. Mosquito density is a key factor determining malaria transmission and males are critical for the maintenance of mosquito populations. We thus investigated whether male Anopheles gambiae s.s. fertility is affected by feeding under laboratory conditions on chemical compounds that have been shown to interfere with fertility of males in other organisms. Anopheles gambiae s.s. Kisumu strain mosquitoes were reared under standard insectary conditions and fed on the compounds either at the larval stage in larval rearing water or as adults, incorporated into the glucose meals. Anti-fertility effects were assessed by determining (i) Sperm production through dissection of the male reproductive glands (ii) Egg-laying by female mosquitoes mated with males fed on the compounds and (iii) Viability of the eggs in terms of hatchability and development of larvae to adults. Although we found no evidence that feeding on the three compounds tested affects male An. gambiae s.s. fertility, our findings provide a context within which results of such studies can be interpreted and thus provide insights for possible further studies in the area.

Luna Kamau holds a PhD in Molecular Entomology from Kenya University, Kenya. She has extensive research experience in molecular vector biology and ecology, vector control, population genetics, insecticide resistance and development of new tools for vector identification and control. Luna has also served in diverse areas of leadership in science at her home institution and beyond, serving in committees dealing with research coordination, health and safety and scientific and ethics review as well as participated in peer and grant application review and student thesis examination. She has a good publications track record, acquisition of competitive research funding and student mentorship.

Julius Kofi Hagan

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Incorporation Of Heat-tolerant Genes In Exotic Layers For Increased Egg Production Under Warm And Humid Environment For Increased Food Security

Layer breeds of chicken in Ghana do not perform to their full genetic potential due to the warm and humid environment under which these birds are raised, among other factors, albeit reduced egg production. This is a recipe for food insecurity. A breed improvement program aimed at incorporating heat-tolerant genes into these layers was carried out. Four phenotypic groups of layers as far as the expressions of the heat-tolerant traits were concerned were generated. They were: naked-neck frizzle, naked-neck only, frizzle only and normally feathered. These birds were generated after 7 successive generations of backcrossing. A laying performance of 400, 16-week old pullets (100 from each of the four phenotypes) was evaluated in a completely randomized design (CRD) experiment. There were four replicates, each with 25 birds. The birds were kept in partitioned open-sided deep-litter pens and fed ad libitum with layer diets containing 18% crude protein and 2800 Kcal ME/kg. Results obtained showed that layers which had the double doses of the heat-tolerant genes (naked-neck frizzle) were significantly ($p \leq 0.05$) superior in terms of age at sexual maturity, feed conversion ratio and egg weight as compared with their counterparts which either naked-neck only or frizzle only. Birds with a combination of the two traits laid at significantly higher rates than their counterparts with a single dose of the genes, which in turn also laid at a significantly higher rate than birds without any of the two traits. The results show that incorporating heat-tolerant genes into exotic layers would make them more adaptable to hot and humid environments thereby ensuring food security. This is evidenced by increased egg production observed in the naked-neck and frizzled birds compared to their fully-feathered counterparts.

Dr Julius Hagan is a senior lecturer and Head of Department at the Department of Animal Science, School of Agriculture, University of Cape Coast, Cape Coast, Ghana. He is an Animal Breeder and Geneticist with a PhD in Animal Breeding and Genetics. His research interests range from the incorporation of heat-tolerant genes in layer chickens for improved egg production under heat-stress environments; conservation of local animal genetic resources for food security; assessing the presence and frequency of useful mutant heat-tolerant genes in local livestock genetic resources. He was awarded the 3rd best young professional scientist in Africa in 2013 by CTA and his innovation was selected as one of the top 20 innovations in the world by CTA in 2014. He is a fellow of Science and Technology for Society (STS, Tokyo, 2016). He is currently a member of TWAS Young Affiliate and a founding member of TWAS Young Affiliate Network (TYAN). He is also the national secretary of the Ghana Society of Animal Production (GSAP).

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Multi-spell Hazard Models For Fertility Dynamics With Unobserved Spatial Heterogeneity

Multi-spell events are common in many social processes. In this paper, we develop a discrete-time hazard model with multiple spells to analyze birth progressions in a cohort of woman to understand fertility dynamics. The model permits incorporating spatial random effects to capture unobserved heterogeneity. Two types of spatial structures are assumed, with uncorrelated spatial component assuming exchangeable priors, and the correlated structures assuming Markov random field prior. The importance of including unobserved heterogeneity in multistate duration models is illustrated with data on birth dynamics of in Namibia using the recent 2013 Demographic and Health Survey. Evidently, ignoring unobserved heterogeneity can, however, produce incorrect results. The implications of choosing shared or correlated unobserved heterogeneity are highlighted.

Lawrence Kazembe, PhD, is an Associate Professor with the University of Namibia. He has previously served as senior biostatistician at Malawi Liverpool Wellcome Trust Clinical Research Programme in Blantyre, Malawi, in 2010-2012; as a research fellow at Medical Research Council of South Africa, 2005-2007. He has worked as a consultant statistician UNICEF, WHO, UNDP and EU since 2005. He has published extensively, with over 70 peer-reviewed publications in population health. In 2008, he was recognized as a young scientist by the Malawi National Commission of Science and Technology, and subsequently a young research affiliate by TWAS-ROSSA, and later in the year was acknowledged as a young biometrician at the Sub-Saharan Network of International Biometrics Society (SUSAN-IBS) meeting in Nakuru, Kenya. He obtained his PhD in 2007 from the University of KwaZulu-Natal. His main research interests are in Bayesian statistical modeling, spatial analysis with applications in population health.

Luis Zapata

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Relics from a violent protostellar merger in Orion

In this talk, I will show the recent results obtained in deep ALMA observations of the explosive outflow located in the heart of the Orion Nebula, the Orion Kleinmann-Low Nebula (Orion KL). These observations revealed over a hundred arcsecond wide and tens of arcseconds long high-velocity 12CO (J=2−1) streamers that approximately point to a central region where a young stellar massive system disintegrated about 500 yrs. The kinematics and morphology of the molecular streamers confirmed the explosive nature of the outflow in Orion KL. The energetics of the explosive outflow require the formation of a binary with an AU-scale or smaller semi-major axis.This event may have led to stellar merger which powered the explosion in the gas. Finally, I will show the latest efforts to reveal more cases where possible mergers events could led explosive outflows like the one in Orion.

Dr. Luis Zapata is one of most productive and cited young astronomers in México, working at the Instituto de Radioastronomía y Astrofísica (CRyA), UNAM, in Morelia, México. His research interests include the formation of stars and planetary systems employing observations at millimeter and submillimeter wavelengths of the interstellar dustand the molecular warm gas. He has used observatories across the world, such as The Very Large Array and The Submillimeter Array located in the USA, and the Atacama Large Millimeter/Submillimeter Array located in the Atacama desert in Chile.

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Enduring Neurotoxic Effects Of Perinatal Exposures To Pesticides In Mice

Parkinson's disease (PD) is a multifactorial neurodegenerative disorder with late-life onset. It has been hypothesized that PD could arise from events that occur early in development, but that may have delayed adverse consequences in the nigrostriatal dopaminergic system during the adult life. Although some lines of evidence indicate that developmental exposure to neurotoxicants (including pesticides) could make the nigrostriatal dopaminergic system more susceptible to subsequent challenges during the adult period, the molecular mechanisms mediating this phenomenon are unknown. Therefore, we investigated potential occurrence of late nigrostriatal dopaminergic dyshomeostasis induced by exposures to the pesticides paraquat (PQ) and maneb (MB) during the early-postnatal development. In addition, we investigated whether PQ and MB exposure during critical periods of development could enhance the vulnerability of the dopaminergic system to the toxicity induced by a subsequent re-exposure to these same pesticides in adult life. Male Swiss mice were treated with a combination of PQ and MB (PQ + MB; 0.3 + 1.0 mg/kg/day; s.c.) from post-natal (PN) day 5 to 19. Postnatal pesticide exposure neither induced mortally nor modified mouse body weight and motor function. However, significant decreases in the striatal activity of mitochondrial complex I and II were observed. Moreover, postnatal PQ + MB exposure reduced the levels of tyrosine hydroxylase (TH) and dopamine transporter (DAT) in the striatum, as well as decreased the number of TH and DAT positive neurons in the substantia nigra pars compacta (SNpc). Parallel groups of mice (3 months) developmentally exposed to PQ + MB were re-challenged to these same pesticides (PQ + MB; 10 + 30 mg/kg/day; s.c., twice a week during 6 weeks) during adulthood. Animals subjected to PQ + MB exposures during both periods (postnatal + adult exposures) presented lower motor performance compared to animals exposed to these pesticides during a single period. In addition, mice subjected to PQ + MB exposures during both periods (postnatal + adult exposures) presented significant lower numbers of TH and DAT positive neurons in the SNpc, although no significant differences among groups were observed in the striatum. Taken together, these findings indicate that exposure to PQ + MB during either the postnatal period or adulthood causes neurotoxicity in the mouse dopaminergic system and that the sum of the two exposures (postnatal period plus adulthood) causes a higher neurotoxicity when compared to exposures during a single period.

Marcelo Farina: My research interests are in the mechanisms mediating the toxic effects of environmental pollutants toward the central nervous system, with a particular emphasis on the potential occurrence of neurodegenerative disease as consequence of pollutant-induced neurotoxicity. I have been particularly interested in metal and pesticide toxicity in the brain. My research addresses basic mechanisms in experimental models with tissue cultures and rodents.

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Flux Growth Of Transition Metal Oxynitride Crystals For Photocatalytic Water Splitting

Transition metal (oxy)nitride perovskites with narrow band gaps and suitable band structures are regarded as an emerging class of inorganic materials that can effectively utilize solar energy in the visible light region for photocatalytic water splitting and environmental remediation. We investigated three beneficial approaches for improving the photocatalytic efficiency of oxynitride perovskites: (i) to reduce the defect density and to improve visible-light-driven photocatalytic water oxidation activity by applying an NH3-assisted direct flux growth method, (ii) to enhance the visible-light-driven photocatalytic water oxidation activity by bandgap engineering (tungsten doping), and (iii) to explore tungsten-based oxynitride perovskites (AW(O,N)3, A = Sr, La, Pr, Nd, and Eu) as novel materials for visible-light-driven photocatalytic water oxidation. The findings evidenced that the direct flux growth method and tungsten doping improved the photocatalytic water oxidation activity.

Dr. Mirabbos Hojamberdiev is a Senier Researcher at Turin Polytechnic University in Tashkent, Uzbekistan. His main research activity centers at the fabrication, characterization, and application of visible-light-active photocatalytic materials for energy and environmental applications. More specifically, he is studying the effects of crystal facet, morphology, dimension, and size on visible-light-driven photocatalytic water splitting and removal of organic pollutants from contaminated water and air of oxide and non-oxide crystals. His is the receipient of the President's Award of the Republic of Uzbekistan in 2004, TWAS Prize for Young Scientists in Developing Countries in 2010 and Atta-ur-Rahman Prize in Chemistry for Young Scientists in 2015. He is a TWAS Young Affiliate and a member of Global Young Academy.

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Crystal Structure And Counterpoise-Corrected Energies, NBO, HOMO···LUMO And F···.I And F···S Interaction Energies Of Unusual [CH3SI2][SbF6] Salt

A single crystal X-ray diffraction study of [CH3SI2][SbF6] (1) indicates crystallization in the monoclinic space group P21/c, Z = 4, with unit cell parameters a = 7.998(2), b = 9.803(2), c = 13.101(2) Å, β = 100.580(12)°. This molecule is consists of a cation [CH3SI2]+ which is novel as the first example in the literature with CH3S and two iodide. In the crystal structure, the cation in 1 is connected via different types of intermolecular between CH and I with the F of SbF6–. The binding energies of these interactions were calculated by B3LYP using the aug-cc-pVDZ for F, C and H, aug-cc-pV(6+d)Z for Sb and I and lanl2dz for S. In addition to its novelty as first structure of its type, the obtained results suggest that salt 1 are significantly important for its attractive intermolecular F···I interaction.

Monther A. Khanfar is currently a staff member at the University of Jordan, Amman-Jordan. His current research interests involve the synthesizing of new complexes with catalytic and medical applications. This also includes fluorine chemistry and crystal structure determination

Mubasher Jamil

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Particle Dynamics Around Rotating Black Holes

The dynamics of a charged particle moving around a slowly rotating Kerr black hole in the presence of an external magnetic field is investigated. We are interested to explore the conditions under which the charged particle can escape from the gravitational field of the black hole after colliding with another particle. The escape velocity of the charged particle in the innermost stable circular orbit is calculated. The effective potential and escape velocity of the charged particle with angular momentum in the presence of magnetic field is analyzed. This work serves as an extension of a preceding paper dealing with the Schwarzschild black hole [Zahrani et. Al. Phys. Rev. D 87, 084043 (2013).

He was selected as the Young Affiliate Fellow of "The World Academy of Sciences" (TWAS), Italy in 2012 for a period of five years. Recently he is nominated by TWAS Executive Director to participate in the 66th Lindau Nobel Laureate Meeting. Later he was selected as a member of Global Young Academy (GYA), Germany in 2012. He is a life-time member of Pakistan Physical Society and the National Academy of Young Scientists (NAYS), Pakistan.
His current research interests include aspects of Black Hole Physics including super-radiance, geodesic dynamics, fluid dynamics etc. He also works in Theories of Modified Gravity.

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[(H2P4W6O34)2Co2Na2(H2O)2]14-: A New, Carbon-free, Polyoxometalate (POM) Catalyst For Oxidation Of Water

A new Na14[(H2P4W6O34)2Co2Na2(H2O)2].26H2O species with photocatalytic ability has been prepared and then characterized with the aid of FTIR spectroscopy, UV–visible spectrometry, TG/DTG, EDS–SEM, cyclic voltammetry, magnetic measurements, 31P-NMR, and single-crystal X-ray diffraction. With a turnover number of 180 and a turnover frequency of 8.3x10-4 s-1, this polyoxometalate exhibits high catalytic activity for the oxidation of water.

Dr AlDamen's graduated from Universitat de Valencia – Spain 2008. His research interests involve the synthesizing of new clusters (polyanions and complexes) with catalytic, magnetic and optical interest. He has sound graduate and undergraduate teaching experience, has supervised two PhD students and two Master students. He awarded distinguished researcher award for 2011 and extraordinary certificate for the best publications in the University of Jordan at 2004.

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Digging Of Phytochemicals Using Mass Spectrometry Machines

Plant metabolites can act as drugs for the treatment of a variety of diseases due to their unique skeletal features. A large number of plant metabolites are used as drugs for the treatment of many diseases. The structural diversity of these plant metabolites formed by complex enzymatically controlled pathways is still not fully explored. Therefore, new methods are required for their better, unambiguous and high-throughput investigations which enable their better utilization. High-throughput mass spectrometric machines such as MALDI-MS and ESI-MS/MS, can be the techniques of choice for sensitive and high-throughput detection of natural products in plant materials. This talk will consist of two parts. In the first part; efficient matrix free method based on the analysis of plant powdered material for the screening of plant metabolites through Laser Desorption Ionization Mass Spectrometry (LDI-MS) will be discussed. We have recently developed a fast and reproducible matrix free approach for the direct detection of metabolites in plant materials without any prior sample preparation. The plant material is mechanically ground to a fine powder and then sieved through different mesh sizes. The collected plant material is dispersed using 1 microL solvent on a target plate is directly subjected to Nd:YAG 335 nm laser. The strategy was optimized for the analysis of plant metabolites after study of the different factors affecting the reproducibility and effectiveness of the analysis, including particle sizes, types of solvents, and the part of the plant analyzed. Moreover, several plant species, known for different classes of metabolites, were screened to develop the generality of the approach. The developed approach was validated by the characterization of withaferin A and nicotine in the leaves of Withania somnifera and Nicotiana tabacum, respectively through comparison of its MS/MS data with the standard compound. This approach can be used to directly probe small molecules in plant materials, as well as in herbal formulations for chemical fingerprinting. Details will be presented in the lecture. The second part of the talk will focus on the high-throughput dereplication strategy for the investigation of different classes of natural product through LC-MS/MS in the plant extract. Classical phytochemical investigation employing large amounts of plant extracts from bulk raw materials. To preserve the endemic and non endemic plant species and their sustainability, the quantity of plant material has been limited to the analytical level. Therefore, a sensitive, analytical and high-throughput dereplication strategy like LC-MS/MS is needed for the analysis of natural products in complex mixtures. We have recently developed structure-fragmentation relationship (SFR) of various classes of natural products including withanolides (steroidal lactones), pregnane-type steroidal alkaloids and Buxus steroidal alkaloids and indentified them in the extract of Withania somnifera, Sarcococca coriacea and Buxus papillosa, respectively, by using positive ion electrospray ionization quadropole time of flight mass spectrometry (ESI-QTOF-MS/MS) and LC-MS/MS analysis. Moreover, the fragmentation pathways and characteristic fragments of a new triterpenoid and some diterpenoids by using ESI-QqTOF-MS/MS will also be presented in the lecture.

Dr. Syed Ghulam Musharraf, is among the most promising young chemist of Pakistan working as an Associate Professor at H.E.J. Research Institute of Chemistry, International Center for Chemical and Biological Sciences (ICCBS), University of Karachi, since 2007. Dr. Musharraf is an established practitioner of hyphenated techniques, such as GC-MS/MS and LC-MS/MS in various applications of natural products chemistry, proteomics and metabolomics. He has published over 100 research papers in reputed international journals including US patent.

Aisha Mohyuddin

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Crop Drought Tolerance: Strategies And Improvements

Drought, being one of the most severe abiotic stresses, negatively affects growth of different types of plants including food crops. Drought-induced adverse effects on plant growth and productivity are believed to be mainly due to changes in cell membrane integrity, pigment contents, water relations, nutrient or hormone imbalance, photosynthetic processes, source and sink metabolism, etc. Under water stress, various biochemical and physiological changes in plants have also been observed as defensive mechanisms. While working with a number of crop species, it has been found that in Pakistan as well as in other parts of the world, crop productivity is mainly limited by water stress. An extensive research have been carried out to examine the effects of different stresses on potentially important cereal crops (wheat, rice, maize), vegetables (carrot, cauliflower, okra, pea, turnip, radish, brinjal), oil-seed crops (canola, sunflower, safflower) and grasses. Improvement in crop tolerance to various stresses has been one of the major focuses of researches. Various shotgun approaches like exogenous application (seed priming/soaking, foliar and rooting medium application) of osmoprotectants (GB and proline), mineral nutrients (K, N, Ca, and P) and plant growth regulators (salicylic acid, aminolevulinic acid, tocopherol) employed which have shown substantial improvement in plant growth and production under stressful environments. Determination of mineral nutrient accumulation, reactive oxygen species (ROS), enzymatic and non-enzymatic antioxidants, oil contents and oil composition are the part of research work conducted so far. This area of research is quite relevant to agricultural productivity in Pakistan as agriculture is the backbone of our country's economy.

I am Professor and Head of the Biogenetics program at National University of Medical Sciences, Rawalpindi, Pakistan. Most of my research has been on the genetic diversity of Pakistani populations and disease genetics in Pakistan. My current focus of research is pharmacogenetics of various drugs including those used to treat neuropathic pain and immunosuppression in Pakistan. I believe in translational research and would like to concentrate my efforts on research that results in improved patient and health care.

Olaniyi Amos Fawole

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Value Adding Potential Of Pomegranate Fruit Peel: A Pharmacological Prospective

Apart from postharvest losses, processing of pomegranate fruit yields the arils or juice but also generates huge quantity of biomass as waste in the form of peel and marc. Practically, one ton (907.18 kg) of pomegranate fruit yields approximately 35% juice and generates about 669 kg of other co-products, mainly peels, which are regarded as wastes. Uses for these wastes are scarce and their disposal represents a problem. This study evaluated the pharmacological perspectives of value adding potentials of pomegranate fruit peel. In vitro antibacterial, antioxidant, and tyrosinase-inhibition activities of methanolic extracts from peels of seven commercially grown pomegranate cultivars were investigated. Antibacterial activity was tested on Gram-positive (Bacillus subtilis and Staphylococcus aureus) and Gram-negative bacteria (Escherichia coli and Klebsiella pneumonia) using a microdilution method. Several potential antioxidant activities, including radical-scavenging ability (RSA), ferrous ion chelating (FIC) and ferric ion reducing antioxidant power (FRAP), were evaluated. Tyrosinase enzyme inhibition was investigated against monophenolase (tyrosine) and diphenolase (DOPA), with arbutin and kojic acid as positive controls. Furthermore, phenolic contents including total flavonoid content (TFC), gallotannin content (GTC) and total anthocyanin content (TAC) were determined using colourimetric methods. HPLC-ESI/MSn analysis of phenolic composition of methanolic extracts was also performed.
Methanolic peel extracts showed strong broad-spectrum activity against Gram-positive and Gram-negative bacteria, with the minimum inhibitory concentrations (MIC) ranging from 0.2 to 0.78 mg/ml. At the highest concentration tested (1000 µg/ml), radical scavenging activities were significantly higher in Arakta (83.54%), Ganesh (83.56%), and Ruby (83.34%) cultivars (P< 0>50%) against monophenolase and diphenolase activities at the highest screening concentration. The most active peel extract was the Bhagwa cultivar against monophenolase and the Arakta cultivar against diphenolase with IC50 values of 3.66 µg/ml and 15.88 µg/ml, respectively. High amounts of phenolic compounds were found in peel extracts with the highest and lowest total phenolic contents of 295.5 (Ganesh) and 179.3 mg/g dry extract (Molla de Elche), respectively. Catechin, epicatechin, ellagic acid and gallic acid were found in all cultivars, of which ellagic acid was the most abundant comprising of more than 50% of total phenolic compounds detected in each cultivar.
The present study showed that the tested pomegranate peels exhibited strong antibacterial, antioxidant and tyrosinase-inhibition activities. These results suggest that pomegranate fruit peel could be exploited as a potential source of natural antimicrobial and antioxidant agents as well as tyrosinase inhibitors.

Dr Fawole is a research academic in postharvest technology and value-addition of horticultural at the University of Stellenbosch. His research focuses on development of high value and shelf stable semi-finished or finished products from horticultural crops and wastes for multiple applications in downstream industries.

Pablo Bolanos Villegas

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Regulation Of Embryo Development In Tropical Fruit Plant Carica Papaya

Fruits are a source of vitamins and minerals across the developing world. In Asia, Africa and Latin America consumption of papaya is widespread. Nonetheless production is constrained by the lack of varieties adapted to the conditions of each particular country. The development of seeds that resemble high yield parental plants (e.g. apomixis) would be a cheap and efficient way to boost production in an uniform way. In this project we characterize embryo sac development in two parental lines. Microscopy and gene expression profiles are studied in order to determine if changes in the expression of cell fate genes occur. This work is preliminary and it is hoped that collaborations across the developing world may speed up development of new apomictic-like papaya varieties.

I mostly deal with homologous DNA repair, and how it mediates adaptation and tolerance to environmental stress. I also do applied science, I do plant breeding involving cytogenetics and mutagenesis. I work at the Molecular Biology Lab of Fabio Baudrit Agricultural Research Station, which is located at La Garita, in Alajuela City.

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Cancer bioenergetics: novel insights on targets and drugs

Among the physiological hallmarks of cancer, altered glucose metabolism is perhaps the most common. Aerobic glycolysis is observed in approximately 90% of human tumors and may be required for new biomass formation. In fact, proliferation of cancer cells is accompanied by activation of glycolysis. Moreover, glycolysis may confer tumor cells with the ability to adapt to new microenvironments or cope with stress during tumor progression and metastasis. The aim of our studies is to investigate potential targets for antitumoral therapy through the evaluation of the unique energetic metabolic profile present in cancer cells. Besides, we evaluate the effects of the novel drugs on the metabolism and physiology of the cancer cell lines. These novel approaches may identify treatments that would be more selective to aggressive tumors with minimal effects over non-tumoral cells.

Prof. Zancan is the Head of the Molecular Oncobiology Laboratory. Her research focuses on the study of signalling in cancer biology aimed to control the development of cancer cells through novel pharmaceutical approaches. Prof. Zancan is an Associate Professor at UFRJ, TWAS Young Affiliate (2016-2020) and TWAS Young Affiliates Network (TYAN) co-chair (2016-2018).

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Discovery Of ENOblock As Plasmodium Falciparum Enolase Inhibitor: Mechanism Of Inhibition, X-ray Crystallography, In Vitro And In Vivo Studies

Malaria is a global public health problem with high mortality rates. In 2015, 214 million cases of malaria with estimated 438,000 deaths were reported by World Health Organization (WHO). Therefore, new therapeutic alternatives with innovative mechanism of action are extremely needed. Glycolytic enzymes play important roles in Plasmodium biology. Enolase (EC 4.2.1.11) is a dimeric metalloenzyme that catalyzes the second to last step in glycolysis, reversibly converting 2-phosphoglycerate (2-PGA) to phosphoenolpyruvate (PEP).
ENOblock was discovered as a P. falciparum enolase inhibitor with inhibitory activity in the submicromolar range. Next, mechanism of inhibition investigation indicated that ENOblock is a non-competitive inhibitor with respect to substrate. The crystallographic complex solved at 1.8 ÄA resolution indicated that ENOblock binds to a binding site located in the dimeric interface, which is in good agreement with the kinetic studies. To investigate whether ENOblock would be an inhibitor of the parasite growth we evaluate its inhibitory activity against sensitive- and resistant-chloroquine P. falciparum strains (3D7 and K1, respectively). The evaluated in vitro assays indicated that ENOblock inhibits both strains in the low micromolar range. Additionally, cytotoxicity evaluation showed that the compound is not cytotoxic (SI > 375). As a proof of concept, ENOblock was orally administered to infected mice with P. berghei. The in vivo activity investigation demonstrated that P. berghei parasitemia was significantly reduced after oral treatment with ENOblock (100 mg/Kg, during 3 consecutive days). ENOblock decreased the parasitemia by 82% and 70% at day 5 and 7, respectively, when compared with not treated control group.
In sum, we assessed ENOblock inhibitory activity against P. falciparum enolase and discover a non-competitive inhibitor with inhibitory activity in the submicromolar range. In addition, we solved the 3D structure of the Enolase-ENOblock complex and demonstrated the compound inhibitory activity both in vitro and in vivo.

Assistant Professor at the Institute of Physics of São Carlos (IFSC) of the University of São Paulo (USP). He received his PhD in Biomolecular Physics from University of São Paulo in 2008, with two years of postdoctoral experience in medicinal chemistry and structural biology - University of São Paulo. He is specialist in the integration of computational and experimental methods. His research is focused on structural biology and medicinal chemistry toward the discovery and development of new antimalarial drugs and agrochemicals. Currently, he is chair of the Division of Medicinal Chemistry of the Brazilian Chemical Society

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Botryococcus Braunii: An Alternative Source Of Carotenoids And Its Possible Applications

Microalgae are the potential source of bioactive compounds such as carotenoids, lipids, fatty acids, hydrocarbons, polysaccharides, amino acids, nutrients, and vitamins, which are unique to them for commercial value. Carotenoids from algae are well recognized in the global market for their applications in food and health industries. However, the production of carotenoids from algae is not yet sufficiently cost effective to compete with synthetic ones and also other technologies in terms of massive production, cell harvesting and extraction methods. In this context, the current paper presents Botryococcus braunii as an alternative source of carotenoid production for commercial applications. Our research group has reported that lutein was the major carotenoid in this alga among other carotenoids. This paper is addressing the aspects that include culture of algae, enhancement of carotenoids by stress factors, accumulation, extraction, analysis, identification, characterization, and structural elucidation of carotenoids from B. braunii culture, and special attention paid to their biological activities. This paper provides up-to-date information on carotenoids in B. braunii culture for commercial applications.

Research Interests: Biotechnology; Food Science and Technology, Aquaculture; Functional Foods, Nutraceuticals, Research expertise: Actively involved to the research activities through expertise in biotechnology, specifically mass algal culture, high value metabolites such as pigments, lipids, fatty acids, and their use in food, feed, nutraceuticals, and biopharmaceuticals applications. Our research group conducted experiments on algal cultivation, isolation, identification, characterization of bioactive molecules from microalgae, and also evaluated their biological properties such as anti-lipid peroxidation, anti-oxidant, anti-cancer, hepatoprotective activity, bioavailability, etc in in vitro and in vivo models. we also focusing on food safety related projects.

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Electrocatalytic Oxidation Of Organic Pollutants: Kinetic Considerations For Environmental Applications

Fundamental understanding of the dynamics of the electrochemical oxygen transfer reaction is of crucial importance for the development of key concepts of electrocatalytic processes, leading to the implementation of environmental electrochemistry wastewater treatment reactions as well as the rational design of the suitable electrocatalytic systems. The scope and mechanisms for the electrocatalysis of oxygen transfer reactions on metal oxide electrodes will be discussed, providing some examples of the behavior of different kinds of molecules on various electrocatalysts, describing the development of kinetic models and correlations between thermodynamic properties and kinetic data leading to new information about structure-reactivity relationships. It will be showed that, the open circuit decay of the concentration of radical cations obtained from spectroelectrochemical data, allows correlating the structure of adsorbed states with reactivity during oxygen transfer reactions, pointing as well to research efforts needed to understand the catalytic performance of metal oxide electrodes in decomposing organic compounds strongly adsorbed on their surfaces. Finally, the importance of predicting reaction rates, and the physicochemical parameters that describe the chemical interactions during the electrolysis of organic compounds in the understanding, design, operation and control of these reactive systems will be highlighted.

The main research interests are on electrochemistry and heterogeneous photocatalysis, including thermodynamic and kinetics of the redox reactions, electrocatalysis: fundaments and applications, environmental chemistry, electrochemical energy conversion, electrochemical sensors, phase formation phenomena and electrochemical integration processes for new era technology.

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Antibacterial Activity Of Ilex Paraguariensis (Yerba Mate) Against Gram Positive And Gram Negative Bacteria

Leaves of the plant Yerba Mate, Ilex paraguariensis, are popularly used in South America, and some Middle Eastern countries in the preparation of tea infusions. Previous literature studies of have displayed a wide range of biological activity. The antibacterial activity of aqueous extract of Ilex paraguariensis leaves was assayed on different strains of Gram positive and Gram negative bacteria.

In the present work, the antibacterial activity of dialyzed aqueous extract of commercial leaves was studied against standard strains of Staphylococcus aureus, Pseudomonas aeruginosa, Acinetobacter baumannii and Escherichia coli. The antibacterial activities of these extracts were also tested against 25 clinical isolates of Klebsiella pneumonia, Enterococcus faecalis, Enterobacter aerogenes, Enterobacter agglomerans and Serratia marcesens.

Antibacterial activity of the Yerba Mate aqueous extract was observed against all tested strains; however, it varied between Gram positive and Gram negative organisms, showing a greater activity against standard S. aureus and Enterococcus faecalis with MIC of 0.468 mg/ml and 0.468 mg/ml and MBC of 0.468 mg/ml and 1.875 mg/ml, respectively. In addition, the extract displayed a high activity against standard Acinetobacter baumannii with MIC and MBC 0.468 mg/ml. The antibacterial activity of the extract did not show any correlation with the profile of resistance of the tested bacteria, standard E. coli and ESBL producing E. coli both had the same MIC (1.875 mg/ml) and MBC (3.750 mg/ml). The MIC for Methicillin Sensitive S. aureus and Methicillin Resistant S. aureus was also the same (1.875 mg/ml). AmpC producing E. coli and OXA-48 producing E?. coli both exhibited the same MIC and MBC (3.750 mg/ml). In general, the MIC and MBC values ranged between 0.468 mg/ml and 15 mg/ml. Furthermore, testing for synergism/antagonism between Yerba Mate and beta-lactam agents revealed slight antagonism. A more in-depth analysis to identify the active molecule responsible for this activity as well as testing a wider range of bacterial isolates is important for a better understanding of the potential role of Yerba Mate in developing new antibacterial agents and in elucidating its interactions with antimicrobial agents used in the clinical setting.

Roula Abdel-Massih received her Ph.D. in Biological Sciences from the University of Glasgow, U.K. in 2001. She served as the Chair of the Department of Biology, from 2008-2011. She obtained a Certificate of Completion for the Art and Practice of Leadership Development Program (May 2016) at Harvard.

She was selected by The New York Academy of Sciences and the STS to participate in the 2015 Future Leaders program in Japan and was elected as an education fellow in the National Academies in the Life Sciences (2015-2016). Her primary research focus is on the structural characterization of plant cell wall complex carbohydrates and the identification of biologically active plant components (anti-proliferative, anti-bacterial…).

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DNA Typing For Genetic Diseases Investigation And Human Identification

Genetic disorders prevalence in Tunisia is relatively high due to consanguinity and endogamy. These disorders are physically and socially disabling and their impact on health care is costly.
We perform DNA typing for a large spectrum of genetic diseases in order to understand their molecular mechanism and etiology and to introduce their molecular diagnosis in the Tunisian population. Our results revealed the clinical and genetic heterogeneity of these disorders which reflects a rich genetic heritage of the Tunisian population. Our studies have allowed the setting up of rapid and cost effective diagnosis permitting early, even pre-symptomatic diagnosis and preventive intervention.
Otherwise, in the frame of our activity in the genetic typing core facility, we determine the DNA fingerprints for the resolution of forensic cases such as the identification of human remains in terrorism attacks and illegal immigration. We have developed for the first time in Tunisia a rapid and effective molecular protocol for human body identification using in particular dental DNA.

Dr Rym KEFI is an Associate Professor (PhD, Habilitation Research) in Institut Pasteur in Tunis.Team leader in the Laboratory of Biomedical Genomics and Oncogenetics and responsible for the genetic typing core facility. She obtained her Master degree and a PhD at the University of the Mediterranean (France). She joined in 2006 Institut Pasteur in Tunis. She is mainly involved in Research on ancient DNA, human genetic disorders, genetic diversity and genetic typing in forensic. She is also involved in training and teaching activities.
She is TWAS young affiliate and Global Young Academy member. She is author/ co-author of more than 60 publications.

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Montmorillonite Clay And Lactobacillus Paracasei BEJ01 Mixture Counteracted Immuno-Physiological Alterations From AFB1 In Rats

High contamination by aflatoxin B1 (AFB1) has been detected in Beja province (Tunisia), in many dairy products and animal feed has resulted in many tons of cereals and cereals being removed from market and causing economic loss. While removal represents a means of reducing risk, exposures still occur. Studies have increasingly focused on means of AFB1 biodegradation/elimination using lactic acid bacteria and clay mineral. In the study here, Lactobacillus paracasei BEJ01 (LP) and montmorilonite clay (MT) were used to reduce the physio-/immunotoxicologic disorders that could develop in rats that underwent AFB1 exposures for a total of 7 consecutive days. The results indicated that rats treated with AFB1 (80 µg/kg BW) alone had significant decreases in lymphocytes in their blood (including B-lymphocytes, CD3+, CD4+, and CD8+ T-lymphocyte subtypes, and NK cells), immuno-globulins (IgA and IgG), and pro-inflammatory cytokines; these rats also had altered oxidative stress status. In contrast, in rats treated with LP+TM (2 × 109 cfu/ml [~ 2 mg/kg] + 0.5 mg TM/kg BW) for a total of 7 days before, concurrent with, or after AFB1 treatment, there was a significant blockade/mitigation of each AFB1-impacted parameter. Moreover, treatment with the mixture at any point in relation to AFB1 treatment unexpectedly caused enhanced TNFα and IL-1 expression relative to control values; all other parameters were comparable to values noted in control rats. Alone, the mixture had no impact on host parameters. From the results here it may be concluded the LP+MT mixture was effective in protecting these hosts against AFB1-induced immunologic/physiologic disorders and that LP + MT could prevent and/or mitigate AFB1 toxicities in vivo.

Dr. Samir ABBES is an associate professor and Head of Food Safety Research Group at the Laboratory of Genetic, Biodiversity and Bio-resources valorization, higher Institute of Biotechnology of Monastir,Tunisia. He was interested in the field of food mycotoxin-contamination and immuno-physiological effect of fungal toxin in animal and humain. He interested also, in the use of bioactive compounds, clay mineral, probiotic bcteria as feed-additive against mycotoxin contaminated diet in order to prevent toxicity of livestock. He is now a partner and shareholder in research project, where He specialize in searching natural minerals, bio-molecules from plants and probiotic bacteria as a food/feed additive against mycotoxin toxicities in animals.

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Medicinal Plants As Source Of Bioactive Natural Compounds

Plants have been used as medicinal agents from the ancient to the modern time, first only on a folkloric basis and later developed on a scientific basis into single agent drugs [1]. The search for new pharmacologically active agents obtained by screening natural resources such as endophytic fungus and plant extracts has led to the discovery of many clinically useful drugs that continue to play a major role in the treatment of human diseases. In Cameroon, most plant extracts which are used in traditional medicine might contain several bioactive compounds which can be used in drug development. Our work on some of these medicinal plants using general strategies for drug development has led to interesting results. In this talk, we will present our recent results obtained from the study of some Cameroonian medicinal plants.

Prof. Simeon F. Kouam received his doctoral training in natural product chemistry at the University of Yaoundé 1 in Cameroon. His post-doctoral training was in the same field at the HEJ University of Karachi, Pakistan in 2004 and at the University of Paderborn, Germany in 2006. The main target of his research is the isolation of bioactive compounds from natural resources such as plants and fungi. From the results of his investigations, he generally advises the local population for the optimal use of the studied plants.
The research approach of Prof. Kouam has progressively been directed to the bioassay-guided isolation, and has led to the isolation of several bioactive compounds from many Cameroonian medicinal plants and from fungi associated with them. He has investigated, among others, the constituents of several medicinal plants including Dorstenia mannii, Harungana madagascariensis, Vismia laurentii, Eriosema glomerata, and the endophytic fungi Coniothyrium sp., Microsphaeropsis sp., and Seimatosporium sp. (See CV). Several secondary metabolites were isolated from the active extracts of plants and fungi, from which he and his co-workers were able to identify many antimicrobial compounds. For example, they were able to isolate compounds such as plumericin and isoplumericin, two carcinogenic compounds, from Plumeria rubra.

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Developing The Resources To Combat An Asian Cancer

The majority of head and neck cancer patients are diagnosed in Asia, and unfortunately the mortality and morbidity associated with these cancers are high, particularly in this region of the world. The head and neck cancer program in Cancer Research Malaysia has developed innovative tools and resources to aid in patient management and laboratory research. The focus of our research is in early detection and the development of novel therapies for head and neck cancer. To address some of the challenges that we face in late diagnosis of oral cancer, have developed a tele-oncology tool, aimed to stream-line the management of oral cancer patients in rural areas. In the laboratory, we use our understanding of the molecular basis of cancer to identify genetic drivers of head and neck cancers and leverage on this information to develop novel therapies for these cancers. Our programs in the development of cancer immunotherapy and drug repurposing will be described.

Prof Cheong is the Senior Group Leader of the Head and Neck Cancer (HNC) Research Program. Her research focuses on unravelling the genetic drivers of HNC and she works in the areas of cancer immunotherapy, drug repurposing and uses CRISPR/Cas9 genetic screens to develop novel therapies for HNC. Prof Cheong is an Adjunct Professor at University of Malaya, a Fellow of the Union for International Caner Control (UICC) and a Fellow of the International Academy of Oral Oncology (IAOO). She has published in international peer-reviewed journals, delivered keynote and plenary lectures both nationally and internationally, and is a recipient of international awards and grants.

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New insights about zika virus infection using iPS cells

In the last years, progress has been made regarding the differentiation of human pluripotent stem cells into neural stem cells and astrocytes, growing into neurospheres and cerebral organoids. These models offer an exciting new range of opportunities to investigate developmental changes associated with zika virus (ZIKV) infection in human neural cells. Using immunocytochemistry and electron microscopy, we showed that ZIKV targets human brain cells, reducing their viability and growth as neurospheres and brain organoids. Combining transcriptomics and proteomics, we showed that ZIKV alters the molecular fingerprint of neural stem cells by activating responses to viral replication, DNA damage targets, cell cycle arrest, apoptosis, as well as the downregulation of neurogenic programs.

Stevens Rehen is a Brazilian neuroscientist specialized in stem cell research. Currently, Stevens is the Research Director of Institute D'Or for Research and Education (IDOR) and Professor at the Biomedical Sciences Institute from UFRJ. Authoring some of the first papers that demonstrated the existence of genetic mosaicism in the brain, Rehen was a pioneer in culturing human iPS cells, neurospheres and brain organoids in Brazil. He led the team that described metabolic alterations linked to schizophrenia using reprogrammed cells. In 2016, Stevens developed one of the main scientific publications about Zika virus, demonstrating the association between infection and microcephaly using human brain organoids.

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Functional Genomic Interactions In A Congenital Blinding Disease Among Children In The Developing World

As per the WHO report on global blindness and visual impairment, a child goes blind every 5 seconds worldwide. These conditions include blinding diseases that are genetically inherited, infections, ocular cancers, retinopathy associated with prematurity and various types of trauma. Among them, primary congenital glaucoma (PCG) happens to be a leading cause of blindness among children in the developing world. PCG occurs due to developmental defects in the anterior segment of the eye and optic nerve, leading to retinal ganglion cell dysfunction and if untreated, leads to irreversible blindness. Genetic and clinical heterogeneity are the hallmarks in PCG and multiple genes with varying magnitudes of effect have been implicated. Over the last 15 years, we have demonstrated that (i) the mutation spectrum of PCG are strongly structured by geographic and haplotype backgrounds of the candidate genes and follows the human migration route, (ii) a combination of genome wide association studies and whole exome sequencing in our large cohorts of PCG patients have indicated the involvement of novel candidates involved in the pathophysiology of cilia and extracellular matrix remodeling, complement activation and cell signaling, (iii) the co-inheritance of multiple mutant alleles across these novel genes have been functionally validated, which indicated that the mutations perturbed the existing associations of the cosegregating genes in vitro and (iv) the severity of the phenotypes were contingent upon their modifier roles in vivo. Finally, we have established genotype-phenotype correlations based on these digenic and physical interactions of genes in PCG that revealed functional of combinations of the mutant alleles to be of seminal importance in the clinical manifestation. These data enhances our understanding of the underlying molecular mechanisms in PCG and provides clues for devising predictive testing for a better prognosis among the susceptible children in the developing world.

Scientific expertise: Dr. Subhabrata Chakrabarti is a genome biologist who focuses on understanding the functional genomics of complex eye diseases like glaucoma and the genetic epidemiology of age related eye diseases. The primary aim lies in providing molecular insights into the disease pathogenesis for devising means for predictive testing in populations.

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Exploring The Antimalarial Potential Of Dried Whole Plant (WP) Cymbopogon Citratus (Lemon Grass)

Malaria is a health problem concentrated in the poorest Sub-Saharan African countries. Because of the development of resistance and adverse reactions to common antimalarials as well as their limited affordability and accessibility, it is important to investigate other options for malaria therapy. Plants have been used as therapeutics for centuries and as source of pharmaceutical antimalarial drugs. In this study, the antimalarial activity of the dried whole plant (WP) Cymbopogon citratus (Lemon Grass) was evaluated. This plant has been used a herbal infusion against fever and malaria. The antimalarial activity of the whole plant was assessed in two rodent malaria models, Plasmodium chabaudi AS, which generates a self-cured infection, and P. berghei ANKA, which is lethal. Results showed that the WP C. citratus treatment produced prolonged antimalarial activity against both parasites. In addition, two whole plant doses of 1600mg/kg and 3200mg/kg were respectively tested. The low dose elicited higher antimalarial activity than the high dose, indicating a potential saturation of receptors with the high dose. As a prophylactic treatment, the whole plant displayed higher antimalarial activity than chloroquine as well as the plant's infusion. These findings provide evidence of the antimalarial effectiveness of the dried whole plant C. citratus and supports continued efforts towards developing whole plant therapies for the management of malaria and other infectious diseases in resource poor settings.

Uchechukwu Chukwuocha is currently a senior lecturer and research scientist in the Department of Public Health, Federal University of Technology, Owerri, Nigeria.
Research interest includes the epidemiology, socio cultural factors and control of malaria and other tropical infectious diseases. Current focus is on developing whole plant therapies (WPs) alternatives low cost treatments for the management and control of malaria in poor endemic areas.

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Effects Of Biodigestion Of Chicken Manure On The Hygienic Quality Of Leaves Of Solanum Macrocarpon Linn (Solanaceae) Produced In Urban Agriculture

Solanum macrocarpon is a vegetable produced by almost 95% of Benin's market gardeners. Although consumption of this vegetable is equally important in this country, concerns have been raised about the hygienic measures for its culture. This study aimed to offer technical production of improved health quality vegetable based on anaerobic bio-digestion of chicken droppings. Once this process implemented, vegetable cultivation was done to compare the loads of vegetables pollutants by the type of manure used.
The study showed that the load of bacteria decreased in the compost, with values from 6.5. 106 CFU / g to 3.4. 104 CFU/g for thermotolerant coliforms and 3.5. 105 CFU/g to 5.4. 103 CFU/g for Enterococcus spp. Lead, complexed by chemical reactions, was reduced with a content of from 2.39 mg / kg to 0,204 mg / kg. Amendante value of the manure has been improved by increasing assimilable phosphorus, from 9.96% to 16.40% and the reduction of total nitrogen, of 18900 mg / kg to 13096.33 mg / kg. The data resulting from this study allow to envisage a large-scale production of S. macrocarpon improved hygienic quality. These results can be transferred to any vegetable product by growers.

My research interests are related to Microbiology and Hygiene linked to the exploration of traditional plants which are effective against infectious diseases from enteric pathogens. Knowing the molecular characteristics of these pathogens in order to better contribute to their mitigation is also my topic

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Production Of Chemicals From CO2 By Engineered Cyanofactories

In the past 15 years, more than 20 bulk chemicals were synthesized from CO2 by cyanobacteria. This includes C2 chemical, such as ethanol; C3 chemicals, such as acetone and isopropanol; C4 chemical, such as butanol; and C5 chemical, such as isoprene. Theoretically, most of the bulk chemicals that can be produced from sugar by heterotrophic microorganisms can be produced from CO2 by engineered cyanobacteria. However, the production efficiency of cyanochemicals is much lower than that produced from sugar by heterotrophic microorganisms. Most cyanochemicals were produced at the level of mg/L and only a few were produced at the level of g/L. Improving cyanochemicals production, with the consideration of CO2 fixation efficiency, distribution of endogenous carbon flux, conversion efficiency of downstream target chemical synthetic pathway and redox balance, will greatly promote the process from cyanochemicals to cyanofactories. This presentation will highlight our recent achievements in this field, including development of a super strong promoter, improving the catalytic efficiency of Rubisco through molecular engineering, incorporation of partial Calvin cycle into heterologous bacteria, and improvement of photosynthesis efficiency through cofactor engineering.

Dr. Yin Li is interested in molecular physiology and metabolic engineering of microbes for efficient production of bio-based chemicals. His group has developed efficient genetic/genomic manipulation tools for several industrial microbes, and pioneered in engineering microbial strains capable of producing chemicals from carbon dioxide. He is also an expert on the physiology, genetics, and applications of Lactic Acid Bacteria. He has published more than 120 articles in peer-review journals including Science and PNAS, with over 3100 citations and an H index of 32. He is an Editor of Microbiology and a Research Editor of Microbial Cell Factories.

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Searching for anti-scrapie compounds using a biochemical and biophysical assay platform

The search for anti-prion compounds has been encouraged by the fact that transmissible spongiform encephalopathies (TSEs) share molecular mechanisms with more prevalent neurodegenerative pathologies, such as Parkinson's and Alzheimer's diseases. Cellular prion protein conversion into protease-resistant forms (PrPRes or PrPSc, the scrapie prion protein) is a critical step in the development of TSEs, thus being one of the main targets in the screening for anti-prion compounds. Our group investigates the anti-scrapie activity of a series of small organic compounds, as trimethoxychalcones, oxadiazoles and quinolines. We have identified potential anti-prion compounds by screening them in cell lines infected with scrapie PrP and observing significant reduction in PrPRes levels. The most promising compounds, i.e, those that i, were non-toxic to non-infected cells; ii, reduced PrPRes levels > 50% and iii, had good pharmacokinetic profile, as predicted in silico, were further evaluated through different approaches in order to gain inferences about their mechanism of action. None of them changed PrPC expression in murine neuroblastoma (N2a) cells as shown by real-time RT-PCR. Among them, two compounds were effective in a cell-free PrPC to PrPSc conversion assay using mouse recombinant full-length PrP (rPrP23–231) as substrate and PrPSc seeds from mouse and human brain. However, when rPrP90–231, which lacks the N-terminal domain, was used as substrate, only one trimethoxychalcone remained effective, indicating that this compound seems to interact with the globular domain of PrP (region 121-231). Furthermore, these compounds prompted the cellular internalization of this protein. In agreement with the cell-free conversion result, a PrP fibrillation assay showed that these two compounds delayed recombinant PrP conversion into the amyloid form and also reduced the fibril content. Based on these results, we hypothesize that two investigated compounds (a trimethoxychalcone and an oxadiazole) may act as multi-target ligands, since their efficacy is attributed not only to the conversion inhibition, but also to cellular effects.

Support: CAPES, FAPERJ, INBEB-CNPq.

Yraima Cordeiro obtained her PhD in Biological Chemistry at the Federal University of Rio de Janeiro in 2005. Her main research interests involve protein folding/misfolding and aggregation of proteins related to degenerative diseases, with a focus in the prion protein. The selection and evaluation of therapeutic compound against prion diseases and other neurodegenerative disorders is also a main research topic from her laboratory. She is an Associate Professor at the Faculty of Pharmacy, and is head of the Laboratory for Structural and Molecular Biology

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Molecular Mechanisms of Multi Drug Resistance and Its Reversal in Cancer

Chemotherapy is the most widely used treatment strategy for cancer which is the highest second reason for humanbeing deaths after heart related diseases. However, cellular resistance mechanisms developed by cancer cells and tissues in the beginning or proceeding times to applied anticancer agents is a significant problem preventing succesfull therapy. Resistance developed by cancer cells to structurally and functionally different cytotoxic agents is called as multi drug resistance. The resistance can be observed in the beginning of the treatment or during the treatment known as intrinsic or acquired resistance, respectively. The resistance phenotype is associated with the tumor cells that gain a cross-resistance to large range of drugs that are structurally and functionally different.

Drug resistance mechanisms have different molecular genetics and biochemical reasons depending on the applied drug and the type of cancer. Secondary genetic alterations and disorders in cancer cells may also result in drug resistance. That is why it has vital importance to study and consider all signaling pathways, in multidrug resistance of cancer.

Multidrug resistance raises via many unrelated mechanisms, such as overexpression of energy-dependent efflux proteins, decrease in uptake of the agents, increase or alteration in drug targets, alterations in cell cycle checkpoints, inactivation of the agents, compartmentalization of the agents, inhibition of apoptosis, increases in DNA repair mechanisms, problems related with drug metabolism and aberrant metabolism of bioactive sphingolipids. Exact elucidation of resistance mechanisms and molecular and biochemical approaches to overcome multidrug resistance have been a major goal in cancer research. In this talk, we will explain the mechanisms contributing multidrug resistance in cancer chemotherapy and also touche on the approaches for reversing the resistance.

Yusuf Baran is a Professor at Abdullah Gul University. He received his M.Sc. and Ph.D. in 2002 and 2006, respectively, at Middle East Technical University, Department of Biological Sciences. He is also an active member of many academies including Global Young Academy and The World Association of Young Scientists. He has more than 100 scientific awards. Selected ones are "2013 Young Scientist Award" by the World Economic Forum in 2013, "Outstanding Young Person of Turkey in Scientific Leadership", by International Young Leaders and Entrepreneurs in 2013. In his research, Dr. Baran focuses on cancer biology and science policies.