2010
Summer Research Academy
Symposium

Friday, July 23rd, 2010
9:00 am

J. Bennett Johnston
Health and Environmental
Research Building
Room 111

Sponsored by:

United States
Office of Naval Research

Tulane/Xavier Center for
Bioenvironmental Research

Programme

9:00 am	Opening Remarks	
Oral Presentations		
	Presenter	Mentor
9:10 am	Steven Le	Harish Ratnayaka, PhD
9:30 am	Shavonn Whiten	Syed Muniruzzaman, PhD
9:50 am	Dexter Graves	Guangdi Wang, PhD
10:10 am	Astiney Clark	Howard Mielke, PhD
10:30 am	Break	
10:45 am	Julian McKnight Brittany Tate	Gloria Thomas, PhD
11:15 am	Jamaan Kenner	KiTani Parker-Johnson, PhD
11:35 am	Nadira Abdur-Rahman	Diane Blake, PhD

Acknowledgements

There will be a reception immediately following the acknowledgements.

-All are invited-


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The Summer Research Academy provides critical research training and career exploration for Xavier University undergraduate students. Each experience is offered as an 8-week paid internship.

In the past, the academy has hosted students from Xavier's College of Arts and Sciences, College of Pharmacy, Tulane University and additional undergraduate institutions across the country, as well as local high schools.

The academy is the principal mechanism for facilitating entry of minority students into graduate research studies and ultimately into successful careers in the biosciences arena.

PHYSIOLOGICAL AND ANTICANCER PROPERTIES OF SOYBEAN UNDER ABIOTIC STRESS

Steven Le[1], Stephen Boue, PhD[2] and Harish Ratnayaka, PhD[1]
[1]Xavier University of Louisiana, Department of Biology, New Orleans, LA
[2]USDA-ARS-SRRC, New Orleans, New Orleans, LA

Environmental stress influences plant physiology and secondary productivity in a complex manner. We hypothesized that A) abiotic stresses such as drought and leaf wounding (LW), and application of the stress hormone, Abscisic acid (ABA) would influence photosynthesis, and B) such changes in photosynthesis would be correlated to concentrations of flavonoids and isoflavonoids of importance to human health, in different soy tissues. Thus, two greenhouse experiments, one with drought and LW using cultivar IA 1010LF, and the other with LW and ABA application using cultivars, IA 2032 and MD 4127789 were undertaken to determine the effects of these treatments on leaf photosynthesis, quantum yield and the levels of anticancer kaempferols and glyceollins. All treatments were done in two cycles between R1 – R5 stages. Although photosynthesis dropped 98%, quantum yield decreased only 6% in drought-stressed plants compared with control after the second treatment cycle. Photosynthesis increased 25% in IA 1010LF but decreased 13% and 23% in IA 2032 and MD 4127789, respectively, due to leaf wounding. Quantum yields were generally unchanged under leaf wounding and ABA application. Although ABA application reduced photosynthesis 16% in both IA 2032 and MD 4127789, the reduction was only transient in IA 2032. Kaempferols were more abundant in the leaves while the glyceollins were readily detected in roots. These flavonoids and isoflavonoids are being quantified currently. Responses of both physiological variables and anticancer flavonoid and isoflavonoid profiles to abiotic stress in soybean appear to be cultivar-dependent.

MICROBIOLOGICAL QUALITY OF SUPPLY WATER IN JEFFERSON AND ORLEANS PARISHES

Shavonn Whiten, Arsalan Ismail and Syed Muniruzzaman, PhD
Xavier University of Louisiana, Department of Biology, New Orleans, LA

The purpose of this study was to determine the microbiological quality of distribution water in the New Orleans metropolitan area. During this study, a total of 100 samples of tap water were collected from Metairie, Kenner, Eastern New Orleans, Central New Orleans and the Westbank area. The water samples were analyzed for coliforms, fecal coliform, *E.coli*, and heteromorphic bacterial counts per 100 ml. Our data indicated that 5% of the Jefferson Parish tap water samples were coliform positive. Whereas in Orleans Parish, we found 6.6% samples contained coliform bacteria. Except for one sample from Kenner, all samples that we analyzed had a zero count for *E. coli* and fecal colifom bacteria per 100 ml. In the case of aerobic colony count, 5 out of 100 samples showed 10^4 or more colony forming unit (CFU) per 100 ml.

PROTEOMICS FOR IDENTIFICATION OF NEW POLLUTION BIOMARKERS

Dexter Graves, Ca'ra Schexneider, Guangdi Wang, PhD
Xavier University of Louisiana, Department of Chemistry, New Orleans, LA

A number of persistent carcinogenic and toxic pollutants have been found at elevated concentrations throughout the New Orleans urban environment. The presence of such complex chemical mixtures in the aquatic system can have profound impact on terrestrial and aquatic biota. To understand the full effect of environmental pollutants it is necessary to monitor complete classes of cellular molecules such as messenger RNAs, proteins, and intermediary metabolites. We propose to analyze the proteome of a well-characterized cell line, MCF-7 in response to individual and mixtures of a variety of persistent organic pollutants that have been found at significant concentration levels in the Mississippi river/Gulf of Mexico estuary system. MCF-7 cells will be subjected to exposure to selected PAHs, PCBs, organochlorine pesticides, and pharmaceuticals. To identify changes in protein expression as a result of exposure to individual as well as mixture pollutants, MCF-7 cells will be incubated with selected chemicals and harvested in lysis buffer after 24 hours. Soluble protein concentrations will be determined by amino acid analysis (Meltzer et al 1987). The proteins will be separated by 2D gel electrophoresis, and differentially expressed protein spots will be selected and cut from the gels. In-gel digestion with trypsin will be performed to obtain peptides which will be analyzed by LC-MS/MS to identify the proteins. Alternatively, protein mixtures will be digested first, followed by peptide fractionation and nano-LC-MS/MS protein identification and quantification. Results from this work will establish a working platform based on proteomic analysis for environmental toxicology.

LEAD AND MERCURY IN COSMETICS

Astiney Clark[1] Christopher Gonzales, MS[2], and Howard Mielke, PhD[3]
[1]Xavier University of LA, Department of Chemistry, New Orleans, LA
[2]Lead Lab, Inc. New Orleans, LA
[3]Tulane University, Department of Chemistry and Center for Bioenvironmental Research, New Orleans, LA

The amount of lead found in cosmetics has been a controversial issue for many years. The initial objective of this project was to examine the amount(s) of lead and mercury, two heavy metals, in two types of cosmetic products in an effort to determine the availability of the chemicals in the cosmetic products. Additionally, another objective of the project was to observe the probability of different routes of exposure when using various cosmetics with manufacturers' recommendations. Lead was separated from organic materials and then analyzed using an Inductively Coupled Plasma Atomic Emission Spectrometer (ICP-AES). The data reporting the levels of mercury found in cosmetics was pulled from literary searches. From the ICP analysis, it is hypothesized that a substantial amount of lead in hair coloring agents will be found. This study will continue and advance research initiated 13 years ago. It is hypothesized that the lipsticks that will be analyzed will have only minute traces of lead because the literature states that they contain only lead contaminants. By analyzing these popular products, will make the general public more aware of how high the cost of beauty really is. We thank the United States Department of Agriculture, the United States Office of Naval Research, and the Center for Bioenvironmental Research at Tulane and Xavier Universities for supporting this research.

DEVELOPMENT OF AN INTEGRATED MICROSELEX DEVICE: IMMOBILIZATION OF FOXO1 AND EVALUATION OF DNA BINDING USING MICROFLUIDIC HYDROGELS

Julian McKnight[1], Brittany Tate[2], Loren Hardeman BS[1], Kelly Johanson PhD[1], and Gloria Thomas PhD[1]

[1]Xavier University of Louisiana, Department of Chemistry, New Orleans, LA

[2]Xavier University of Louisiana, Department of Biology, New Orleans, LA

SELEX is a method of identifying and isolating high affinity ligands for a particular target from a large pool of ligands by cycles of affinity based selection and amplification.[5] This method is used for a variety of specific molecular recognition applications, including the analysis of transcription factors. One of the critical steps in SELEX requires immobilization of the target.

Microfluidic technology combined with polyacrylamide hydrogels provides a new method of immobilization. In one approach, a biomolecule is immobilized via physical entrapment within the hydrogel by copolymerizing it with acrylamide monomer solution. The hydrogel can be optimized to physically entrap larger molecules while remaining permeable to smaller analytes. This method has been successfully used for the physical entrapment of large antibodies (~150 kDa) and analysis of smaller antigens (~50 kDa).

Here, we describe the expression, purification, and immobilization of FOXO1, a well-characterized transcription factor, in development of a method capable of evaluation of protein-DNA binding. The photopolymerization of hydrogels, optimization with respect to immobilization of Ovalbumin and FOXO1, and the FOXO1 DNA binding study will be discussed. These characterizations are of value toward the ultimate development of a microSELEX device capable of performing transcription factor/DNA binding and release steps, as well as DNA amplification cycles.

AN EVALUATION OF THE GROWTH INHIBITORY ACTIVITY OF ANTINEOPLASTIC AGENTS IN HUMAN BREAST CANCER CELL LINES

Jamaan Kenner,[1] Tamorah Hawthorne[1], and KiTani Parker-Johnson PhD[2]
[1]Xavier University of Louisiana, Department of Biology, New Orleans, LA
[2] Xavier University College of Pharmacy, Division of Basic Pharmaceutical Sciences

Cancer cell line models that demonstrate disease progression at different stages of the disease provide useful insight on pharmaceutical intervention for drugs targeting stage specific populations of cells. As cancer progression has become better understood, breast cancer has been substratified into the following categories: luminal A, luminal B, her2 type, and basal type. Commercially available anticancer agents have been used to evaluate the antiproliferative affects on cell lines HCC70 and T47D. The alamar blue dye exclusion assay method was used to determine the antiproliferation caused by these agents and our novel anticancer agents in concentrations ranging from 1 millimolar to 1 nanomolar. These data indicate that in HCC70 and T47D cells, novel DJ compounds, which are isochalcones, demonstrate significant antiproliferative effects when compared to commercially available tamoxifen or 5-flurouracil. The prognosis is poor for women with basal type breast cancer; there is an urgent need for novel anticancer agents that have different pharmacological targets than current interventions.

REAGENTS FOR THE DETECTION OF MBINANT PROTEIN EXPRESSION

Nadira Abdur-Rahman[1], Xiaoxia Zhu PhD[2], Marcia B. Henry BS[2], and Diane A. Blake PhD[2]

[1]Department of Biology, Xavier University of Louisiana

[2]Department of Biochemistry, Tulane University School of Medicine, New Orleans, LA

Enzyme linked immunoassay (EIA) uses an enzyme-labeled antibody or antigen to quantify the amount of a particular analyte in a test solution. EIA methods were used to characterize a monoclonal antibody that recognizes c-myc, an epitope commonly added to recombinant proteins to quantify their expression. Bovine serum albumin with a covalently added myc peptide was coated onto microwell plates. Antibody 9E10 was subsequently diluted through the wells of the plate. After a wash step, c-myc binding activity was determined by incubating the plate with an enzyme-labeled anti-mouse antibody. The 9E10 antibody will be used to characterize recombinant antibody fragments in the Blake laboratory.

Bennetta Horne
Program Coordinator

Alden Reine
Xavier/Tulane Liaison

Our Mission

Our mission is to conduct and coordinate interdisciplinary research and learning to enhance global understanding of environmental issues, provide solutions through innovative applications and communication, and inform policy and practice.

Gloria Thomas
Workshop Facilitator

David Maag
Computer Operations