WILLIAM PATERSON UNIVERSITY OF NEW JERSEY

COLLEGE OF SCIENCE AND HEALTH

RESEARCH

INTERNSHIPS AND EXTERNSHIPS

GARDEN STATE—LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION

GS-LSAMP

Emerging Researchers National Conference in STEM—Washington D.C
Poster Presentation Award Winner, February 2015: Adonis Rivie

CELEBRATING STUDENT RESEARCH ACTIVITIES
2015 – SIXTH EDITION

EDITED BY: DR. DANIELLE DESROCHES, COVER BY RITA LEVINE

RESEARCH
INTERNSHIPS, EXTERNSHIPS

WILLIAM PATERSON UNIVERSITY

COLLEGE OF SCIENCE AND HEALTH
BIOLOGY DEPARTMENT
Garden State-Louis Stokes Alliance for Minority Participation (GS-LSAMP)
&
Minority Association of Premedical Students (MAPS)

Celebrating Student Research Activities
2015
Sixth Annual Edition

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Introduction

This is the seventh year the Garden State Louis Stokes Alliance for Minority Participation (GS-LSAMP) program has put together such publication in order to recognize the research efforts and successes by William Paterson University science majors.

As in previous years, Summer Research Internships and Externships have provided students with the opportunity to work on or off campus, in a laboratory or in their field of interest , under the supervision of a faculty. Such opportunity has allowed them to experience firsthand "how scientists work" and how to conduct scientific research. Many actively participated in specific projects, learn new techniques including the use of elaborate laboratory equipment, computer - assisted analyses, animal husbandry and handling, to name a few. Others have spent their summers volunteering or shadowing physicians in Hospitals and Health Clinics. Such internship has proven to be a valuable asset for students applying to Graduate or Professional school, or in job placement or career selection following graduation.

Many of the students included in this publication are ISSBB (Increasing Student Success in Biology and Biotechnology) scholars , an NSF funded scholarship to promote research and teaching careers among Biology and Biotechnology majors.. All the summer interns have presented their summer experience at one of our monthly, well attended, meetings in the Fall 2014 and Spring 2015 semesters. Additionally, several GS-LSAMP students presented their work at the Undergraduate Research Symposium which took place at WPU in April 2014. Others have gone to Regional meetings, including GS-LSAMP Annual STEM meeting at Rutgers (October 2014), National meetings (Society for Neuroscience, October 2014) , ERN meeting in Washington DC (March 2015) to present their work and have received major recognition for their research. Most of these abstracts or summaries are in their own words and represent an honest and candid account of their work. Other abstracts are more formal and were presented at a national scientific meeting.

These summer internships would not have been possible without the support of the Biology , Chemistry and Environmental Sciences faculty who have volunteered to mentor our students. Others have provided contacts for off campus opportunities.

This past summer, GS-LSAMP was able to provide stipends to 15 students. This support as well as this publication would not be possible without the support of Dr. Kenneth Wolf , Dean of CSH and of Dr. Jean Fuller-Stanley, Associate Dean of CSH, LSAMP project director at WPU. Many thanks to the Provost, Dr.Waren Sandmann , for providing the additional funding which was needed. Thanks to his support, an additional 10 students were funded. A total of 25 students were involved. A big thank you as well to Rita Levine for assisting in all matters related to GS-LSAMP and to Andres Salazar of the Science Enrichment Center for his technical and graphic support with this manuscript.

We hope that next's year publication will include many more interns and mentors.

Dr. Danielle Desroches

Professor
Human Physiology and Neuro-endocrinology, PhD
Anatomy and Physiology Coordinator
Minority Association of Pre Medical Students (MAPS) Coordinator
Biology Biotechnology Club (BBC) Faculty Co Advisor
Increasing Student Success in Biology and Biotechnology (ISSBB) Head Mentor
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Research Internships

William Paterson University: Biology Department

Adonis Rivie, ISSBB scholar, BBC President
And William Manzo

Mentors: Kevin Martus* and Jaishri Menon

****Department of Physics, @ Department of Biology***

TITLE: Plasma Treatment Accelerates Tail Regeneration in Tadpole, *Xenopus laevis*

Atmospheric pressure plasma has found large application in regenerative medicine. Presently, we investigated the effect of plasma on wound healing and tail regeneration of tadpoles, *Xenopus laevis* especially role of reactive oxygen species (ROS).

Tail amputation was carried out by removing 40% of the tail and the amputated region was immediately exposed to helium plasma (generated inside a quartz tube with a single electrode powered by an AC voltage (15kHz) having peak-to-peak voltages of 18kV) for 40 seconds. Here we report faster rate of growth of the regenerating tail following plasma exposure. By comparing results on *in situ* staining for ROS, nitric oxide (NO) and mitochondria between experimental and control groups, there is increased ROS (hydrogen peroxide and superoxide but not NO) production at 2h, 4h, 12 h and 24 h post amputation at the wound site in plasma treated tadpoles. However, these ROS species were not derived from mitochondria evident from double immunostaining. Growth of the blastema (5 days post amputation) in experimental group was higher than control with increased ROS, NO and catalase in plasma exposed group compared to control.

Microscopically, in plasma treated tadpoles, cells of wound and blastemic epithelium showed blebbing of plasma membrane, increased cellular lipid droplets, hypertrophy of the cells, increased mitochondrial density, and reduced intercellular connections.

molecules and these tadpoles possess sophisticated mechanisms to respond to stress of plasma and yet hastening the dynamics of wound healing and tail regeneration.

This work is partly supported by the National Science Foundation under Grant Number 1040108.

FIRST PLACE WINNER

ANNUAL BIOMEDICAL RESEARCH CONFERENCE for MINORITY STUDENTS

in

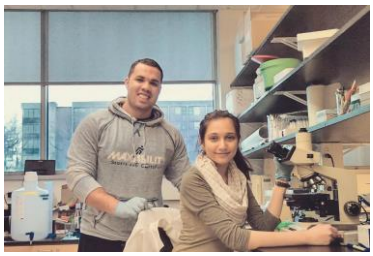
San Antonio , Texas

November 15, 2014

Unnati Chauhan, Daniel Lupo, ISSBB scholars
Mentor: Dr. Emily Monroe


TITLE: Effect of High Light Intensity on Polyketide Synthase Gene Expression in the Florida Red Tide Dinoflagellate, *Karenia brevis*

Karenia brevis is the toxic dinoflagellate endemic to the Gulf of Mexico that causes detrimental human health, environmental, and economic impacts through the production of brevetoxins. Brevetoxins are polyketide compounds produced by polyketide synthase enzymes (PKS), but no gene or protein has been linked to their biosynthesis. Previous work on two PKS proteins, KB2006 and KB5299, suggests a link between chloroplast physiology and toxicity. To test the effect of high light (HL) intensity on PKS gene expression in a non-toxic sub-strain of *K. brevis* (NTB), 1-liter cultures were exposed to HL treatment (~ 100 µmol photons $m^{-2}s^{-1}$) after reaching mid-log phase in control light intensity (~ 60 µmol photons $m^{-2}s^{-1}$). Samples for cell counts and gene expression were taken at T0 (prior to HL treatment) and T6 (6 days post HL treatment) for control and HL cultures. Cultures in the HL treatment entered stationary phase four days post-treatment and rapidly declined while control cultures entered and maintained stationary phase two days later. There were no differences in expression of KB2006 or KB5299 between the control and HL cultures at the transcript level analyzed by qPCR. At the protein level analyzed by western blotting, KB2006 was approximately four times more abundant in HL cultures than control cultures, and KB5299 was half as abundant in HL conditions compared to control at T6. High light intensity affects growth and protein abundance of PKS proteins in the non-toxic sub-strain of *K. brevis* providing additional evidence linking chloroplast physiology and toxicity. Additional analyses are underway to examine effects of HL on brevetoxin production. Developing a better understanding of biosynthetic pathways involved in brevetoxin production will play a pivotal role in management of future algal blooms.



Neal Joshi , ISSBB scholar

Mentor: Dr. Jeung Woon Lee

Neal Joshi, Alec DeGraaf, Noor Eldabagh and Jeung Woon Lee, Department of Biology, William Paterson University, NJ

TITLE: Transplantation of islet of Langerhans cells reverses diabetic hyperglycemia in mice with diabetes mellitus type-1

Type 1 diabetes mellitus (T1DM) is an autoimmune disease destroying pancreatic beta cells causing hyperglycemia. If T1DM is not treated, the patient will eventually develop painful diabetic neuropathy. T1DM is commonly treated daily injections of synthetic insulin. Recent advances in cell biology makes possible to harvest and transplant pancreatic cells. This study examined the reversal of diabetic hyperglycemia by: a) xenotransplantation of rat pancreatic islet cells into a diabetic mice, and b) histological examination of the transplanted tissues in the recipient.

C57 (n=37) mice were injected with streptozotocin for 4 days, and those with a blood glucose ≥350mg/dl were used in the study. Islet cells were isolated from Sprague Dawley rats and cultured overnight (via collagenase). Mice were transplanted (n=20) with the rat islet cells under the kidney capsule. Control mice were injected with culture media (n=17). Body weights were taken daily and glucose levels were taken on days 1, 7, 14, 17, and 21. Mice were perfused and the kidneys were removed for presence of grafted islets.

The average pre-diabetic glucose level was 204±5.5mg/dl. STZ injection increased the glucose level to 520±15.1mg/dl. In the control group, there was a significant increase from the post-STZ glucose on days 7, 14, 21 ($p<0.01$), non-significant on day 1 and 21 ($p>0.05$). In the transplanted group, day 1, 7, 14, 17, and 21 were significantly lower than post-STZ glucose levels ($p<0.01$). Islet transplantation may be a viable method for reversing the hyperglycemia associated with T1DM.

Ammar Ali, ISSBB scholar, MAPS President

Mentor: Dr. Kendall. Martin

TITLE: "Designing TaqMan Probes to quantify species-specific conifer DNA in real-time PCR"

In an attempt to determine the distribution of roots under the ground of a coniferous forest site, a method has been developed which can amplify sequences from conifer roots and distinguish species within that mix of roots quantitatively. This method will prove to be very beneficial considering that visual separation is difficult, tiresome, and sometimes inaccurate when dealing with similar roots. From a multiple-sequence alignment, primer target sites were identified to distinguish the tree-species involved. The primer oligonucleotides were synthesized and optimized for PCR, producing 3 primer sets with good amplification rates. The primers amplify different regions of the gene for ribulose-1,5-bisphosphate carboxylase that include potential probe sites for fluorescence-based quantitative PCR. Sequences for the TaqMan probes were determined using standard criteria. The TaqMan probes, each specific to a conifer species, will be added to the PCR master mix along with the conifer-specific primers. This multiplex reaction in real-time PCR will allow us to determine the relative DNA concentrations of the different conifer species in the sample root mix. From this, root biomass and distribution below the ground can be determined.

Barbara Abboud
Mentor: Dr. David Gilley

TITLE: Quantitate Natural Levels of a Foraging Pheromone within Foraging Honey Bee

As a pre-dental student I was always interested in research and especially animal and behavior research. When I transferred to William Paterson University in my junior year, I was drawn to Dr. Gilley's research about the Quantitate Natural Levels of a Foraging Pheromone within Foraging Honey Bee Colonies and it was very kind of him to allow me to work alongside him in lab.

The honeybee that was used in our research was Carniolan variety. Honeybees perform a Waggle Dance which is a movement preformed by foraging bees to direct other bees to a food source. They do so by producing four pheromones: Tricosane, Tricosene, Pentacosane (combustible) and lastly Pentacosene. My role in lab was to measure the clean hive with mineral spirit and let it dry. I also placed a hotplate and temperature probe in the hive. I then waited until the desired temperature of approximately 35^{o}C was reached. At that time, I pipetted the desired amount of Tricosane on sterile watch glass and placed it in hive. It was given 30 minutes to equilibrate. At 29 minutes, I exposed a fiber to Nap standard and then placed it into hive and let it sit for an additional 30 minutes. After that, I ran the fiber on GC/MS and looked at the absorbance and the area of Tricosane. Once the lab samples are done we can take field samples and compare data. If data points match up we can promote more foraging in bee colonies and that allows more pollination of the crops.

Despite many frustrations and set backs that came along with research, the knowledge I gained about the scientific process is invaluable. This opportunity allowed me to learn how to work independently in a scientific lab, and with the assistance of Dr. Gilley, I was able to conduct my own assays. I will never forget the excitement I felt when I was able to collect the data, analyze it, and trouble shoot mistakes.

Although the lab work I did wasn't directly related to my desired career, this experience exposed me to a side of science that we don't learn in classrooms and I consider it one of the most important experiences in my undergraduate years. Finally, I would like to thank GS-LSAMP and Dr. Gilley for allowing me to participate in his research and increasing my knowledge and confidence in myself as a biology student.

Patrick Fardella

Mentor : Dr. Emily Monroe

TITLE: Genomic Investigations of Natural Product Rich Marine Cyanobacteria

Marine cyanobacteria are major producers of unique bioactive molecules, both toxic and therapeutic, with interesting chemical features. Historically, these molecules have been discovered using chemical approaches, but genomic approaches have aided in the discovery of new bioactive molecules and understanding the biosynthesis of the unique features found in cyanobacterial natural products. In this study, we used various bioinformatics tools to investigate secondary metabolite pathways in a recently sequenced marine cyanobacterium, *Moorea producens* JHB, and began comparative genomic investigations. Using NCBI's Conserved Domain Database (CDD), NRPSPredictor2, and the Geneious software package, we characterized the contigs and scaffolds related to the production of two new molecules isolated from this strain. We then began comparative genomic analyses between two *Moorea* species and other sequenced cyanobacteria using tools available on the Joint Genomes Institute Integrated Microbial Genomes Expert Review (JGI IMG/ER). Together these tools helped identify other genomes from different orders that were genetically similar to the *Moorea* species, which Clusters of Orthologous Groups (COGs) they shared, and how many of each of these COGs were present. Comparative analysis revealed one of the species share similarities mostly within the Oscillatoriales, the order these cyanobacteria belong to, but the other species shares similarities to other cyanobacterial orders suggesting greater genetic diversity. Genomic analysis has not only become a helpful tool in characterizing natural products biosynthetic pathways, but it is also allowing full genome comparisons to understand potential key differences between closely related species.

Alison Caceres

Mentors: Dr. Carey Waldburger and Dr. David Slaymaker

Department of Biology, William Paterson University of New Jersey, Wayne, NJ

TITLE: Genetic Structure of Native and Restored Populations of American Beachgrass (*Ammophila breviligulata* Fern.) Along the New Jersey Coast

New Jersey's coastal dunes provide both natural scenery and structural support for the shore's coastal communities. Therefore, millions of dollars have been spent on dune nourishment and upkeep. However, these dunes were subject to immense damage due to the tropical storm Sandy in October of 2012. Ammophila breviligulata is one of the most important species in New Jersey which had a huge role in the development and stabilization of the destroyed coastal dunes. Dune restoration projects currently involve this beachgrass species specifically and are becoming more and more focused on maintaining their genetic diversity and restoring ecological services and functions. In our study, we collected 150 samples of AB from native and restored populations along the shore. We then used a series of six unique ISSR primers optimized for this beachgrass species to compare their genetic diversity using PCR methods and manually scoring the band presence or absence of the polymorphic loci.

Rebecca Atencio and Erin Connor, ISSBB Scholars

Mentor: Dr. Jeung Woon Lee

TITLE:The Role of Cortisol in Mediating the Pain Response of Children with Austism Spectrum Disorder as Modeled in BTBR T+ tf/J Mice

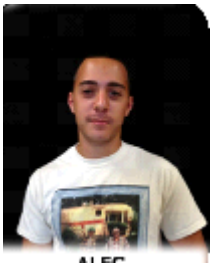
Autism Spectrum Disorder (ASD) is characterized by reduced social interaction, repetitive behaviors and a decreased response to inflammatory pain. Individuals with ASD pose several challenges to their parents, families, and teachers because of the impairments they suffer in communication. It has been documented that on average, people with ASD feel less pain than others. Therefore, the factors which cause people to feel less pain need to be intensely studied so better pain management techniques can be developed.

Currently, BTBR T+ tf/J mice are the common model for ASD because they share the same general characteristics observed in humans which makes them a desirable strain of interest. Recent studies by Dr. Benno have demonstrated that BTBR mice have blood corticosterone levels that are three times that of control C57 mice. Corticosterone is the major stress-coping hormone involved in the immediate stress response. The adrenal glands are responsible for secreting this stress-mediating hormone along with nor-epinephrine and adrenaline. Therefore, we hypothesized that the removal of the adrenal gland will cause an increased formalin pain response.

To test this theory, bilateral adrenalectomy's were perfomed on the BTBR mice as well as C57 mice, which served as the control. One week after the surgery, the animals were subjected to a formalin pain behavior test. This chemical was injected into the left hind paw and the pain response, characterized by licks and shakes on the injected paw were observed and recorded over five minute intervals for an hour. Following the test, their blood plasma and brains were collected for further analysis. The blood will be analyzed using an ELIZA test and the brains will be stained for c-Fos.

Classic biphasic flinch behavior was examined by both strains; however, the formalin phase II for BTBR-ADX and C57-ADX were not significantly different. The hypoalgesic response displayed by BTBR mice may not be mediated by the adrenal glands.

<u>Alec De Graaf,</u> Joshi, N., Eldabagh, N.
Mentor : Dr.J.W. Lee



TITLE: Xenotransplantion of Islet of Langerhan cells from Sprague Dawley rat to diabetic C57 mouse to reverse diabetes-induced hyperglycemia

Diabetes Mellitus is a condition in which the body cannot metabolize sugars resulting in hyperglycemia that can lead to long-term damage of the kidney, eyes, heart, and blood vessels as well as the nerves. Damage to the nerves results in diabetic neuropathy.[1] In Type I diabetes, the body no longer produces insulin or cannot produce the amount proper due to destruction of insulin-producing cells. The cells responsible for producing insulin are known as β-cells and are found in clusters known as Islets of Langerhans. These clusters are located in the pancreas and respond to blood-glucose levels.[2] Type I diabetes was once referred to insulin-dependent diabetes mellitus because patients were dependent on injections of insulin in order to prevent hyperglycemia.[3] This project used a drug known as Streptozotocin (STZ), a selective cell toxin that destroys β-cells in the pancreas, to induce Type I diabetes in mice. In our case, the mice used in the study are the C57/6J, considered to be a "control" strain. The common blood glucose level for animals is 150-180mg/dL. The diabetic condition was defined as blood glucose level greater than 350mg/dL. Glucose readings were recorded using a handheld meter. In order to reverse the Type I condition, β-cells were harvested from the pancreata of adult male Sprague Dawley rats and transplanted into the left kidney of the host mouse. The number of cells harvested and transplanted were recorded in order to determine if the number of cells transplanted would affect the glucose levels of the host mouse. All animals received daily injections of Cyclosporin A (CSA) to suppress the activation of the immune response, in particular T-lymphocytes, from affecting the transplanted cells. [4] Our data suggests the transplantation of β-cells from the Sprague Dawley rat to the C57/6J mouse can reverse the effects of hyperglycemia for up to 24 days.

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Noor Eldabagh, ISSBB scholar
Mentor: Dr. Jeung Woon Lee

TITLE: Transplantation of islet of Langerhans cells reverses diabetic hyperglycemia in mice with diabetes mellitus type-1

During this past summer, I had the great opportunity of being part of a research team in the mouse lab under Dr. Lee's supervision. We were interested in studying diabetes mellitus- type 1 in a C57BL/6J mouse model, something that I had already heard about from one of Dr. Lee's former students and was quite interested in learning more about.

Diabetes mellitus- type 1 is a growing issue in the modern world, and as such, it is important to develop ways to deal with it in an absolute way. Some symptoms that come along with it include loss of weight, frequent thirst and urination, and increased acidity of the body in general. For this reason, we used body weight and glucose levels as indicators for the reversal of the diabetes.

The set-up was as such: We induced diabetes into mice by injecting them with streptozotocin for a period of 4 days, during which their body weights and their glucose levels were recorded. This chemical (STZ) is very toxic to beta cells, which are the insulin producing cells of the pancreas. We then would harvest, filter and collect islets of Langerhans from Sprague Dawley mice, and transplant them in a relatively isolated area that still had a lot of blood supply- the kidneys. Then the mice were monitored for a period of up to 21 days, during their body weights and glucose levels were recorded. They were also administered CSA- Cyclosporin A -an immunosuppressant that would decrease the likelihood of tissue rejection by the mouse's immune system. Our results- although it took a great deal of trial and error to obtain-showed that we were successful in our attempts to reverse the diabetes in the mice! Glucose levels went back to the normal range within 1 day after the surgeries were done, and body weights gradually approached the initial body weights for the mice.

This amazing experience has allowed me to learn how to work with others as part of a team in a productive and time-efficient matter, and it was also a great way of utilizing my summer in a productive way that gives me more hands-on experience as a scientist. It was also very eye-opening to learn from your own mistakes in a tangible way, without getting defeated or overwhelmed. And in the end- our collaborative efforts as a research team paid off when we were able to proudly present our results. I would

like to thank Neal Joshi and Alec DeGraaf for working with me and teaching me all the skills necessary to conduct this research, and for sharing their summer with me in the mouse lab. Also, I sincerely thank Dr. Lee, Dr. DesRoches and GS-LSAMP for allowing me to have this opportunity of dealing with science in a non-academic way and teaching me new ways of learning.

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Brittany Simon, FHP president

Mentor: Dr. Carey Waldburger

TITLE: Studying PhoQ-PhoOP Signal Transduction System in *E.coli*

I am studying the Pho Q-PhoP two-component signal transduction system in *E. coli*. Two component systems are the pre-eminent signaling mechanisms in bacteria for monitoring and adapting to external conditions. PhoQ is an inner membrane protein that initiates signaling responses to extracellular Mg^{2+}, external pH, and two chromosomally-encoded peptides (SafA and MgrB) that communicates the presence of these signals to PhoP, a cytoplasmic transcriptional regulator that modifies the gene expression pattern of the bacterium to adapt to external conditions. PhoQ-PhoP has both critical roles in normal bacterial homeostasis and is also critical in the virulence of a number of enteric pathogens. I have been furthering our understanding of how SafA and MgrB interact with the sensor domain of PhoQ to regulate its signaling capabilities.

An isolated LP87 (Leucing to Proline substitution at residue 87) in PhoQ resulted in a loss of both SafA and MgrB interaction with the sensor domain of Pho Q; while leaving the ability of PhoQ to sense extracellular Mg^{2+} intact. This preliminary research result suggests that the leucine at position 87 is an important binding determinant for SafA and MgrB interaction with PhoQ. In order to further study the interaction between these peptides and Pho Q, PCR mutagenesis using a standard PCR-based protocol was performed. Forward and reverse primers with appropriate nucleotide changes from the wild type phoQ

sequence were used to generate alanine, glutamate, and arginine amino acid substitutions in place of leucine at residue 87 in a plasmid vector containing a fragment of the phoQ gene. The mutation to alanine would result in a loss of the extended nonpolar side chain present in leucine and changes to glutamate and arginine will replace the nonpolar side chain with acidic and basic side chains, respectively. By assaying the effects of these amino acid changes on PhoQ function, we hope to further our understanding of the how PhoQ interacts with and is regulated by interactions with the SafA and MgrB peptides. After confirmation of the mutations in our plasmid variants by DNA sequencing, we will subclone the mutations into a plasmid vector containing the full length phoQ gene and use a simple reporter system where a PhoQ-PhoP-dependent promoter is fused to the lacZ gene, allowing for activation to be measured by simple □-galactosidase assay.

William Paterson University : Physics Department

Joyce June ,ISSBB scholar
Mentor: Dr. Kevin Martus

TITLE : HELIUM PLASMA EXPOSURES: ANALYSIS OF THE VARIATION IN TADPOLE TAIL REGENERATION AND PC12 NEURONAL GROWTH

This past summer, Joyce June worked on two related projects with Dr. Kevin Martus in his plasma physics laboratory. One project was done in collaboration with Dr. Jaime Weiss, Department of Biology, to analyze the effect of exposing a cell line from a rat's adrenal gland (PC12 cells) to Helium plasma. The second project involved exposing the wounds of an amputated tadpole tail to the same Helium plasma. This project was done in conjunction with Dr. Jaishri Menon, Biology Department. The overall goal of the research was to expose the amputated tadpole tails and PC 12 cells from rats' adrenal glands to cold helium plasma to see if the exposure would increase the tadpole tail regeneration rate and neuronal growth in PC12 cells. The tadpoles were supplied and analyzed by the laboratory of Dr. Jaishri Menon after helium plasma exposure. The result showed that 40s indirect helium plasma exposure for tadpole tail induced formation of new blood vessels and expansion of existing blood vessels so more nutrients can be supplied to the wounded site.

For the PC 12 cell experiments, the cells were plated on a collagen-coated cover slip in a completely sterile hood and then the cells were cultivated. Next, the cells were exposed to the helium

plasma for 20s, 40s, 60s, and a 0s exposure was used as a control. Initially, PC 12 cells with absolutely no exposure to plasma were used as control, but later PC 12 cells that were put under the plasma aperture exit without having plasma on were used as control (just flowing Helium gas). For each exposure duration, two plates were used, one for direct and the other for indirect exposure. Each plate contained 12 wells and sets of 3 wells were assigned for each time of exposure. The number of surviving cells and neurites were examined and counted using a cell counter and a microscope at the times of 24 hours, 48 hours, and 72 hours post exposure. The results indicated that for the exposure time of 40s under the indirect helium plasma had a greater number of surviving cells and neurites than any other direct or indirect exposure. The data results were analyzed using ANOVA to confirm the reliability of the results.

The Helium plasma was analyzed using a spectrophotometer to explain what caused acceleration in cellular regeneration of tadpole tails and PC 12 cells' neuronal growth. Analysis indicated that N_2, N_2^+, and OH radicals are present in the plasma along with the expected Helium.

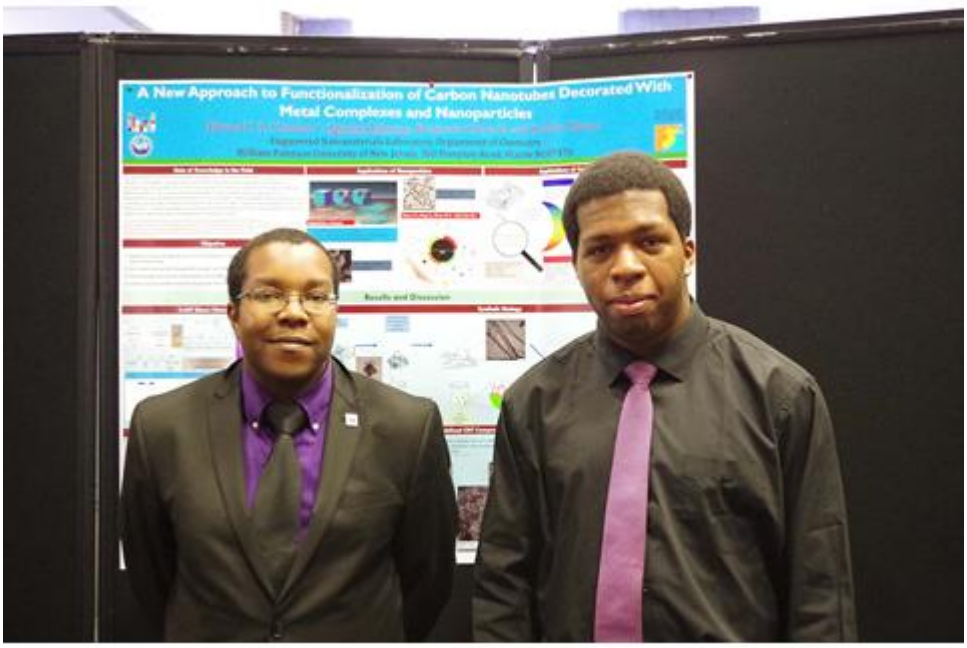
William Paterson University : Chemistry Department

Bryant Catano, ISSBB Scholar
Mentor: Dr. Yalan Xing

TITLE: Transition Metal Catalyzed Functionalization of Terminal Alkynes

The transition metal-catalyzed functionalization of carbon-carbon multiple bonds is an important synthetic strategy. The need for efficient, atom-economical methods to synthesize certain synthetic intermediates under mild conditions with inexpensive reagents has led to the increased investigation of iron catalysts. It has been discovered that both aromatic and aliphatic alkynes can be halo-functionalized to α,α-dihalodimethyl ketals, catalyzed by iron (III) in excellent yields using methanol as a solvent and N-halosuccinimide as the halogen source. This efficient, rapid transformation is highly regioselective and can be run in mild conditions. The deacetalization to α,α-dihaloketones using 8% iron (III) chloride in silica was also observed and can be performed in a one-pot reaction. Direct conversion to an α-haloketone is also observed using isopropanol as the solvent. An investigation into the possible mechanism of this novel reaction is currently underway.

Benjamin Onyechi, Qiaxian Johnson and Swetha Matam
Faculty advisor: Bhanu P. S. Chauhan



Department of Chemistry, Engineered Nanomaterials Laboratory, William Paterson University of New Jersey, 300 Pompton Road, Wayne, NJ 07470

TITLE: A New Approach to Functionalization of Carbon Nanotubes Decorated With Metal Complexes and Nanoparticles

The requirement to produce more effective design strategies for nanomaterials has risen due to ever increasing demand for efficiency, higher degree of organizational control, material recovery, and the ability to fill more niche tasks. By incorporating functionalities which are able to attach to metal nanoparticles and metal complexes provide a very fruitful avenue to property control such as hydrophobicity, recyclability, and stability to name a few.[1] Using this strategy one can generate stable, yet, highly active and recoverable catalytic nano sized metal complexed within such frame works.[2] In recent years, we have shown that carbon nanotubes can be covalently attached to such materials for the added benefit of electrical conductivity, reinforcing, and two dimensional morphology control.[3,4]

In this work, we will present a one pot process through the use of a diaminosilane to produce sol-gel polymerized materials which incorporate metal nanoparticles and complexes from their corresponding metal precursors. In the cases where we produce metal nanoparticles, weakly stabilized metal complexes are used as precursors to produce corresponding nanoparticles in one pot. In this process no extra reducing

agent is required since stabilizing agent also works as reducing agent. These materials formed nanogels with metal nanoparticles impregnated within via the cross-linking of the attached Si-OH moiety. In the second step, these generated nanocomposites are covalently linked with carbon nanotubes via a reaction of Si-OH groups with OH functionalized carbon nanotubes. A detailed analysis of these new and novel nanocomposites as well as preliminary studies of their stability using FT-IR, NMR, TEM, SEM/EDX, and UV-Vis spectrometry will also be presented.

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[1] Corriu, R. Organosilicon Chemistry and Nanoscience. *Journal of Organometallic Chemistry* 2003; 686: 32-41

[2] Wu, Jeng-Yue. Preparation and Structural Characterization of Novel Nanohybrids by Cationic 3D Silica Nanoparticles Sandwiched between 2D Anionic Montmorillonite Clay through Electrostatic Attraction. *Journal of Physical Chemistry C* 2009;113:13036-13044

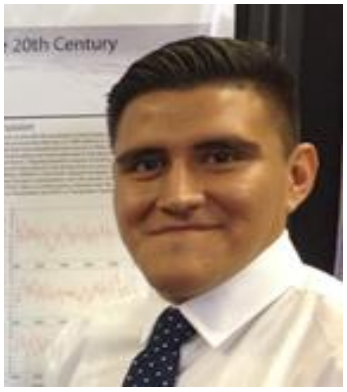
[3] Spitalsky, Zdenko. Carbon nanotube–polymer composites: Chemistry, processing,mechanical and electrical properties. *Progress in Polymer Science* 2010;35:357–401

[4] Chauhan, B.P.S., and Johnson, Q,"Cross-linked carbon nanotubes with alkoxy silyl moieties" *248th ACS National Meeting, San Francisco, Division of Colloid and Surface Chemistry*, 2014, abs. no. 219.

William Paterson University: Environmental Sciences Department

Bryan Gonzalez

Mentor : Dr. Michael Griffiths



TITLE: Reconstructing seawater Sr/Ca through the late Phanerozoic from fossil shark teeth

Bryan Gonzalez[1], Dr. Michael Griffiths[1], Martin Becker[1], Yair Rosenthal[2], Stella Woodward[2]

[1]Department of Environmental Science, William Paterson University, Wayne, NJ 07470, USA.
[2]Institute of Marine and Coastal Science, Rutgers University, New Brunswick, NJ 08901, USA.

Constraining past seawater Sr/Ca ratios is an important and challenging task to scientists, because the chemical evolution of these two cations is fundamentally tied to various geologic and biogeochemical processes related to plate tectonics, weathering, diagenesis, and the carbon cycle. On geologic timescales, shifts in seawater Sr/Ca (Sr/Ca_{sw}) are thought to reflect variations in either the sources of Sr and Ca—which include riverine inputs via weathering, hydrothermal circulation, and calcium carbonate dissolution—or the output flux via carbonate sedimentation. By improving our understanding of seawater Sr/Ca evolution, we can thus potentially gain a deeper understanding of how these processes (controlling these fluxes) have operated on geologic timescales. Ancestral sharks are unique in that they have a globally robust and continuous fossil record since the late Cretaceous. This fossil record is comprised largely of teeth due to: 1) rapid and continuous replacement throughout an animal's lifetime; and 2), their dense, biogenic apatite composition which is highly resistant to chemical and physical erosion. Over the past decade, marine biogenic apatite— specifically enameloid (comprising the dense crown tissue) in modern and fossil shark teeth—has exhibited some success in providing a new tool for reconstructing the evolution

of the world's oceans. This is largely due to the fact that enameloid has been shown to accurately preserve the aqueous conditions of the seawater (i.e. isotope and elemental composition) at the time of tooth formation. Preliminary results of this study demonstrate that the Sr/Ca_{sw} has overall declined since the late Cretaceous (~75 million years ago), a finding that is echoed in other marine fossil assemblages. Whilst this work is still in its infancy, we tentatively interpret the decline Sr/Ca_{sw} to be a regionally (and potentially global) coherent signal, and as such, provides a new record of Sr and Ca flux to the paleo-ocean.

Dan Pagano
Mentor: Dr. Martin Becker

TITLE: A Tale of two submerged cities: Modern sharks in an ancient forest, ancient sharks in a modern forest. An observable model of sea level change.

Dr. Martin A. Becker, Harry M. Maisch IV, Daniel Pagano, and Ralph Scimeca

The study of modern and fossil sharks along the Gulf Coastal Plain of Alabama provides a methodology by which sea level change can be analyzed. Recent research documented a submerged ancient cypress forest (50,000 years old) inhabited by modern sharks located approximately 10-kilometers off the Alabama coast at a depth of 20-meters. By comparison, a modern hardwood forest located approximately 150 kilometers north from the present Alabama shoreline contains an assemblage of abundant fossil shark teeth. These shark teeth occur in middle Eocene (40 million years ago) shallow marine sediments of Monroe, Choctaw, Covington Counties, in south-central Alabama. The 160-kilometer separation between these field localities provides current and observable sea level rise and fall across this region. By raising awareness of the eventual fluctuation of sea level, it becomes evident of humans mistreatment of the coastal environment with the ongoing development of endangered areas. Integrating these models, students are able to utilize real world data in the study of sea level change and global warming all within the foundation of classroom instruction and lesson development.

Nicole Kern
Faculty Mentor: Dr. Jennifer Callanan

TITLE: Clay Mineral Weathering in the Post-Fire Environment

The purpose of this study is to look at the impacts of ash produced during forest burning on subsurface soil clay minerals. Two different minerals were chosen to study: Chlorite a mineral with high susceptibility to weathering and which has been previously studied; and Montmorillonite (Smectite), a mineral with shrink/swell properties and high chemical activity.

The minerals were prepared by grinding to a fine silt-clay size. Ash was generated from burning white pine in a fire pit and collected. (Fig.1)

Figure 1. The process of the burning of the white pine.

Rain water was collected prior to the study and stored under refrigeration. The soil used was purchased in order to maintain soil consistency. Three different weathering solutions were made by filtering rain water through soil, soil and ash, and ash. (Fig. 2)

Figure 2. The filtration set-up for generating the weathering solutions.

After the solutions were made the minerals were mixed into the solution and left out under room temperature conditions for seven chosen time periods. These were chosen based on a pervious study of chlorite weathering over- 1, 2, 3, and 6 months. The results of that study indicated these time periods were too wide and therefore weathering was studied following 3-week intervals over a period of 21 weeks. The pH was measured for each solution, once the clay was added to the solution, and at the end of the weathering process. At the end of the weathering process the clay minerals were extracted from the solutions for analysis. They were analyzed for changes in particle size distribution due to physical weathering on the laser particle size analyzer. They were also analyzed for structural variations due to chemical weathering, as a result of change in pH, by X-ray diffraction.

The results indicated that the pH for chlorite had become more acidic as the weathering interval increased (Fig. 3). The pH of the montmorillonite spiked to more basic at week 12 but then declined to more acidic by week 15 (Fig. 4). The particle size analysis has shown that chlorite has been physically weathered, to finer sized particles (Fig. 5). The montmorillonite, however, does not show physical weathering as a result of the weathering process (Fig. 6). X-ray diffraction analysis did not indicate that either mineral had a change in structural composition due to the weathering process.

The results of this study thus far have been for the weathering intervals up to 9 weeks. Analysis of weathering reactions up to 21 weeks is currently being conducted. In addition, further analysis needs to be done to follow up in this study. The bulk chemistry of the weathered minerals will be determined in Spring 2015 in order to analyze variations in mineral chemistry due to the weathering process.

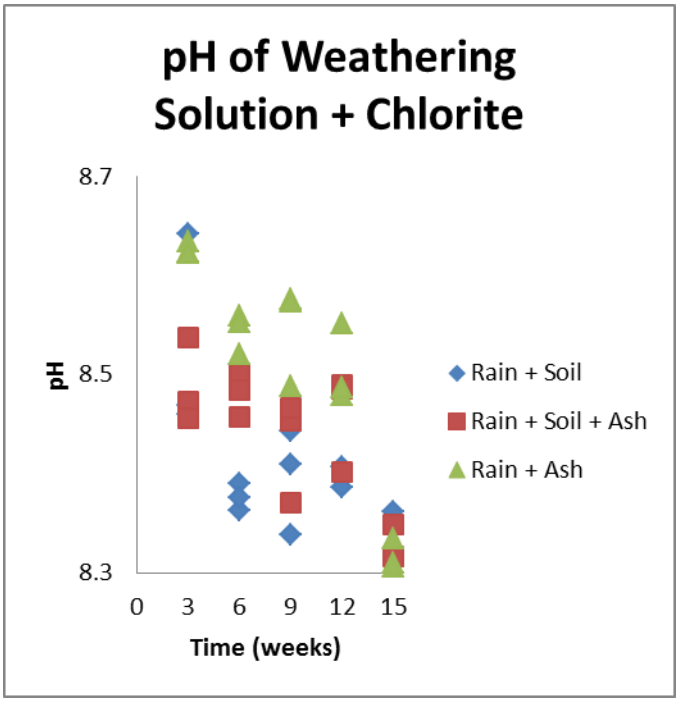


Figure 3. The pH of the weathered solution plus chlorite.

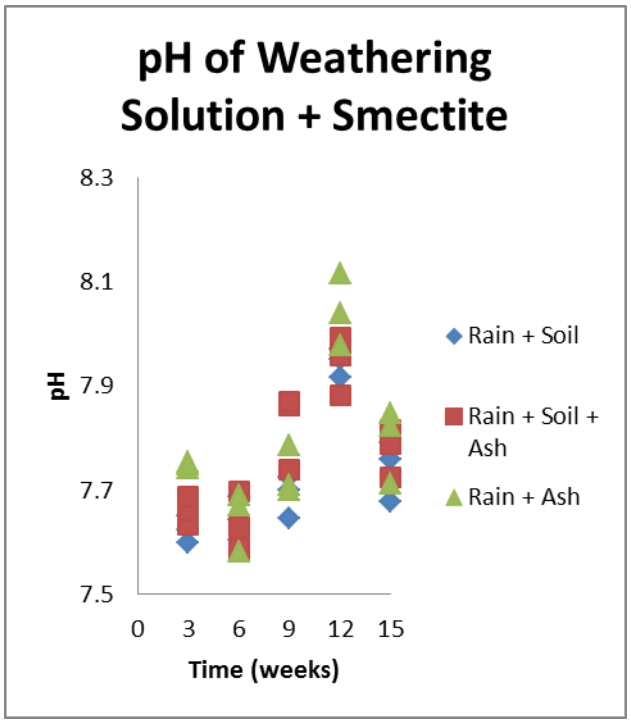


Figure 4. The pH of weathering solution plus montmorillonite.

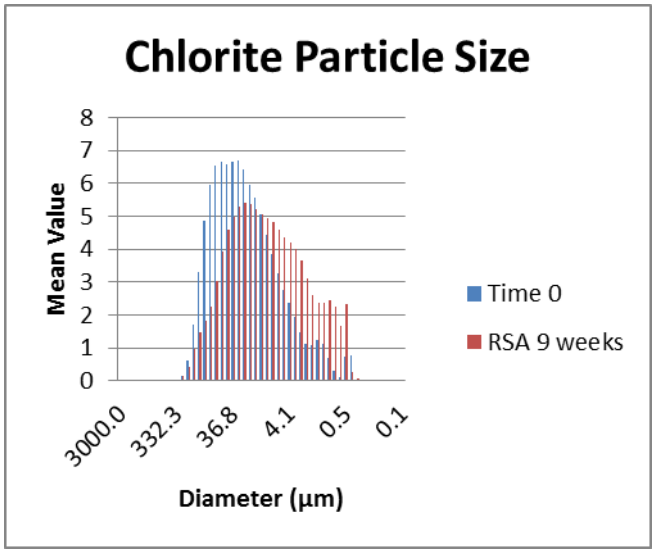


Figure 5. The particle size results for time zero and nine week.

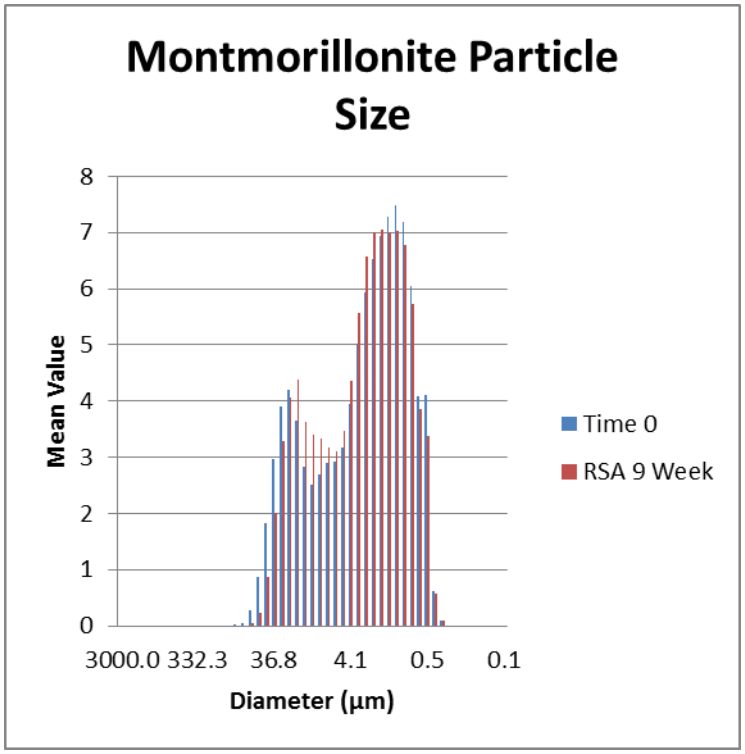


Figure 6. The particle size results for time zero and nine week.

Ralph Scimeca
Mentor: Dr. Martin Becker

Harry M. Maisch, IV[1], Ralph S. Scimeca[2], Martin A. Becker[2], Ben W. Raines[3], and John A. Chamberlain, Jr.[1,4]
T

TITLE: Fish remains from the Tallahatta–Lisbon Formation Contact (Middle Eocene–Lutetian) Pigeon Creek, Covington County, Alabama

A disconformity and lag deposit that separates the Tallahatta and Lisbon Formations along Pigeon Creek near Red Level, Covington County, Alabama contains chondrichthyan, actinopterygian, and osteichthyan remains belonging to: *Nebrius obliquus* (Leidy, 1877); *Striatolamia macrota* Agassiz, 1843; *Brachycarcharias lerichei* Casier, 1946; *Hypotodus verticalis* Agassiz, 1843; *Carcharodon auriculatus* Blainville, 1818; *Pachygaleus cf. P. lefevrei* Daimeries, 1891; *Galeocerdo latidens* Agassiz, 1843; *Abdounia recticona* (Winkler, 1873); *Abdounia enniskilleni* (White, 1956); *Physogaleus secundus* (Winkler, 1876); *Orectolobus* sp.; *Scyliorhinus* sp.; *Rhizoprionodon* sp.; *Pristis* sp.; *Aetobatus* sp.; cf. *Aetomylaeus* sp.; *Leidybatis jugosus* Leidy, 1876; *Rhinoptera* sp.; *Pycnodus* sp.; *Lepisosteus* sp.; *Albula* sp.; *Egertonia* sp.; *Cylindracanthus rectus* Agassiz, 1843; *Sphyraena* sp.; *Triciurides* cf. *T. sagittidens* Winkler, 1874; *Scomberomorus* sp.; and Ariodea gen. indet. This fossil fish assemblage is similar to other contemporaneous nearshore faunas found throughout Alabama, the Atlantic and Gulf Coastal Plains, and elsewhere globally. The accumulation and concentration of fossil remains between the Tallahatta and Lisbon Formations are the result of third order eustatic sea level fluctuation prior to Late Eocene climatic cooling and global sea level regression at the Eocene–Oligocene boundary. Fish fossils along Pigeon Creek reflect a complex taphonomic history of exhumation, transport, and reburial across a shallow middle Cenozoic Shelf. The Pigeon Creek assemblage refines bathymetric interpretations of previously reported

fossil fish assemblages and demonstrates the utility of Middle Eocene fossil fish in local, regional, and global stratigraphic correlation.

[1]Department of Earth and Environmental Sciences, Brooklyn College, 2900 Bedford Avenue, Brooklyn, New York 11210, USA, MH0189@bcmail.brooklyn.cuny.edu; [2]Department of Environmental Science, William Paterson University, 300 Pompton Road, Wayne, New Jersey 07470, USA, beckerm2@wpunj.edu; [3]Weeks Bay Foundation, Inc., U.S. Highway 98, Fairhope, Alabama 36532; [4]Doctoral Programs in Earth and Environmental Sciences and Biology, City University of New York Graduate Center, New York, New York 10016, U.S.A., johnc@brooklyn.cuny.edu

University of Maryland

Adrian Plummer , ISSBB scholar

Mentors : Dr. Jamie Pierson and Dr. Louis Plough

Horn Point Laboratory

University of Maryland Center for Environmental Science

Consequences of Diversification among Acartia tonsa in the Chesapeake Bay

Abstract

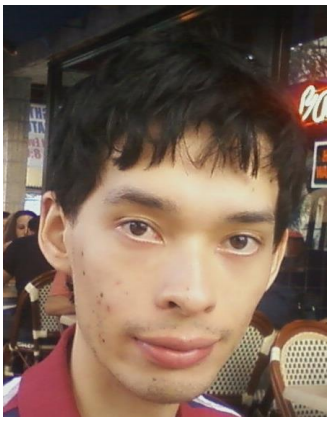
Acartia tonsa is an ecologically important copepod in many of the world's coastal bays, and is a common prey item for many commercially important fish in Chesapeake Bay. Despite its significance, little is known about *A. tonsa* genetic diversity within and between ocean ecosystems, and the possible ecological consequences of cryptic genetic diversity in this species. Previous studies have revealed two divergent, cryptic lineages of *A. tonsa* in Chesapeake Bay that sort spatially by salinity preference, but are also found to be sympatric at moderate salinities (6-12) ppt. The main objective of this study was to find out if these two clades (Fresh-F, and Salt-S) could mate and successfully produce hybrid offspring and any possible fitness consequences to these hybrid matings (hybrid breakdown, hybrid inviability, or hybrid sterility). A protocol was developed to isolate copepods early in development, identify their lineage, and make pair crosses with adults. Strict experimental controls were needed to ensure matings were only between the chosen paired individuals, and offspring fitness differences between within-lineage and hybrid crosses were recorded to measure consequences of hybridization. We found that hybrid (FxS) crosses produced the most eggs, followed by F lineage crosses, while S lineage crosses had the fewest, though there was no significant difference among the crosses (ANOVA P-value = 0.27). However, hatching success differed significantly between hybrid and parental crosses, with an average of just 3.75 % for hybrids vs. more than 60% in the parental crosses, and those hybrid individuals that did hatch, died within two days as nauplii larvae. Our results show that the two lineages of *A. tonsa* in the Chesapeake Bay show hybrid inviability as they were able to produce hybrid offspring, but these offspring never made it beyond early development. Overall, our

results confirm previous genetic data that suggested long term reproductive isolation between the clades, and suggest that where these lineages co-occur, there may be limitations to population productivity due to poor hybrid fitness, though this will need to be explored further. This experiment marks the first successful, directed crosses in *Acartia tonsa* in the literature, and the developed crossing protocol will be useful for future breeding studies in this species.

Presented his research this Spring 2015

at the Association for the Sciences of Limnology and Oceanography in Spain and received an Award for his excellent work

NOYCE INTERNSHIP



Ian Campbell

Computer Science Major

Hello, I am Ian Campbell. During this past summer, I spent six weeks as a Robert Noyce intern and student mentor to high school and middle school students taking summer classes here at William Patterson. I feel that I have helped many of my students in their activities and learned quite a few things about myself, namely, I learned some strategies to keep older “kids” in check and discovered that being a Radio DJ is more interesting than I previously thought it might be. All along the way, I also I also made some new friends.

Apart from learning team-building strategies and workplace ethics, much of the first few actual work days consisted of what may be considered office work, getting ready for the program and such. I also had to go through a day of practice being a mentor. I was assigned to work with someone else during this time, which helped considerably since I would go on to work with another intern for two of the four weeks.

During the actual classes, I was kept very busy. I had to help students learn how to use the university computers and help them get around their seemingly nonfunctional guest accounts. Other duties included escorting students on errands - including a few nurse calls - answering questions about college life, and keeping students from getting too distracted by computers, video games and such.

Going into further detail, for the first day in the first week, it took a while for anyone to figure out how to get the logins working until my co-worker, Gavin, used his account to get a student able to use the computer. I went on to login a considerable number of students for every day that was held in the computer labs, which also meant logging in everyone on the days in which I was the only student assistant there

using my account. Furthermore, on that same day during lunch, a student went missing, which led me to look across the class area and Wayne Hall for a significant portion of the lunch period. I was able to find the student with another group of commuter students where he had been told to go. Following that, I maintained a policy for no students to wander off without telling me what they will do.

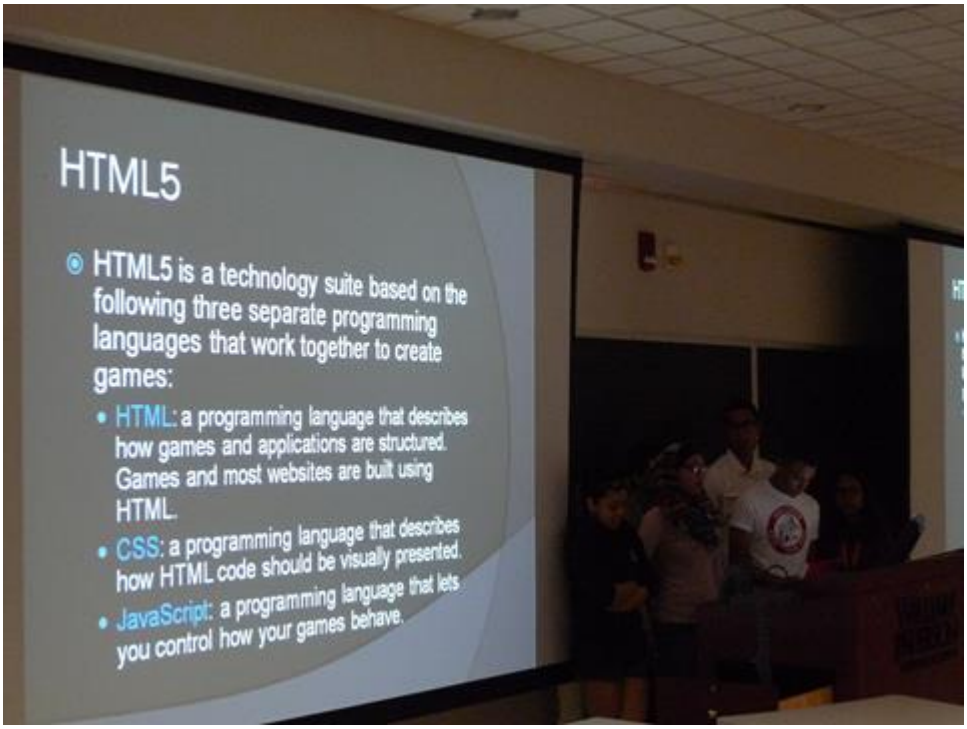
Other important things I did included resolving an issue with a corrupted flash card, getting the class textbooks much sooner than what the professor intended, getting a particular student into the cafeteria without a lunch card and even helping Dr. Najarian with certain complexities in programming, thanks to prior experience with computer programming and computer languages. Ultimately, the class ended with an excellent presentation on Friday followed by some counselors, along with myself, overseeing the students as they took a brief SAT prep class before seeing them off for the week.

In the second week, I was involved with a group of students in Radio DJ-ing and Broadcasting class, which turned out to be an interesting venture. I had no experience with this, so it was all new to me. This class learned the techniques and requirements of being a radio DJ. Eventually, the class took over for the normal staff to operate William Patterson's radio station for a few hours at a time, an impressive feat given that they only had about 3 days of training. I offered musical suggestions to one of the directors for future consideration in radio. I also was able to escort a student to her dormitory and back to retrieve her group's script in time for a broadcast

The final two class weeks were dedicated to computer security and use of computer language to make a website. By then, everyone was well into the routine of the program, and that went smoothly and ended on positive notes and presentations.

Overall, the six weeks of the internship went very well for me and everyone involved. I learned what it really means to help people as a "job" and the students learning what may lead them to future interests in whatever they choose to pursue.

I would like to thank Iris, A.J. and the rest of the staff for giving me the opportunity to do so: thank you.


HTML5
HTML5 is a technology suite based on the following three separate programming languages that work together to create games:
HTML: a programming language that describes how games and applications are structured. Games and most websites are built using HTML.
CSS: a programming language that describes how HTML code should be visually presented.
JavaScript: a programming language that lets you control how your games behave.


FIRST

2014-2015 Meetings with Students Presentation at WPU

September 2014

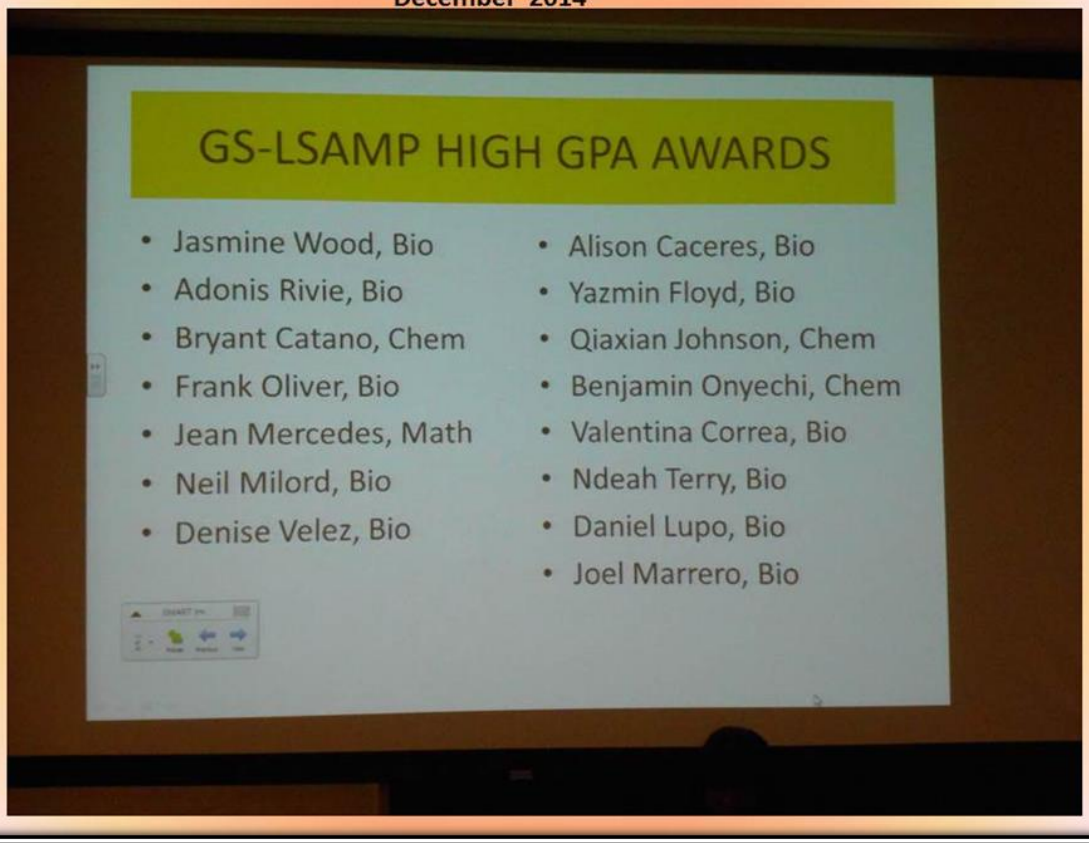
October 2014

November 2014

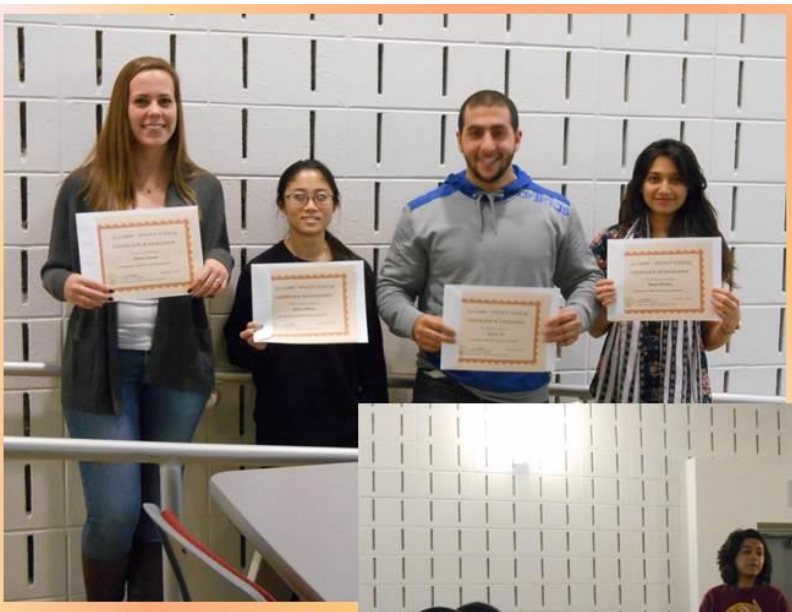
November 2014

December 2014

December 2014

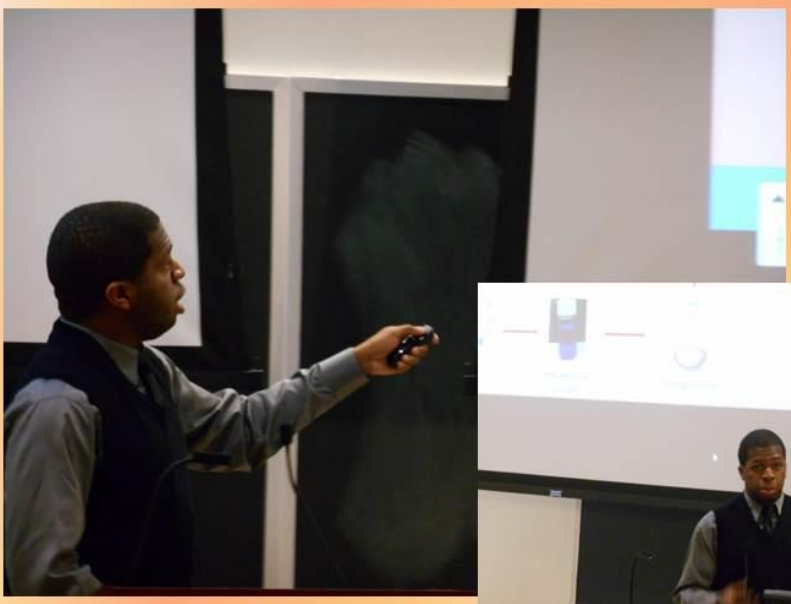


December 2014



December 2014

December 2014



January 2015

<u>Ammar Ali</u> , earned BEST SUMMER 2015 RESEARCH presention


Place Winner
ington DC, Feb 19,2015
AAAS
ology
February 2015


March 2015


WILLIAM
PATERSON
UNIVERSITY


WILLIAM
PATERSON
UNIVERSITY

6TH ANNUAL GS-LSAMP STEM CONFERENCE OCTOBER 3, 2014

Student Participants

Adonis Rivie, Dr. Menon, Bio

William Manzo, Dr. Menon, Bio

Ammar Ali, Dr. Martin, Bio

Rebecca Atencio, Dr. Lee, Bio

Erin Connor, Dr.Lee, Bio

Neal Joshi, Dr. Lee, Bio

Alec DeGraaf, Dr. Lee, Bio

Noor Eldabagh, Dr.Lee, Bio

Alison Caceres Drs. Slaymaker and Walburger ,

Dan Lupo, Dr. Monroe, Bio

Stephanie Costa, Dr. Monroe, Bio

Unnatiben Chauhan, Dr Monroe, Bio

Patrick Fardella , Dr. Monroe,Bio

Qiaxian. Johnson Dr. Chauhan, Chemistry

Benjamin Onyechi, Dr. Chauhan, Chemistry

Swetha Matam , Dr. Chauhan, Chemistry

Joyce June, Dr. Martus, Physics

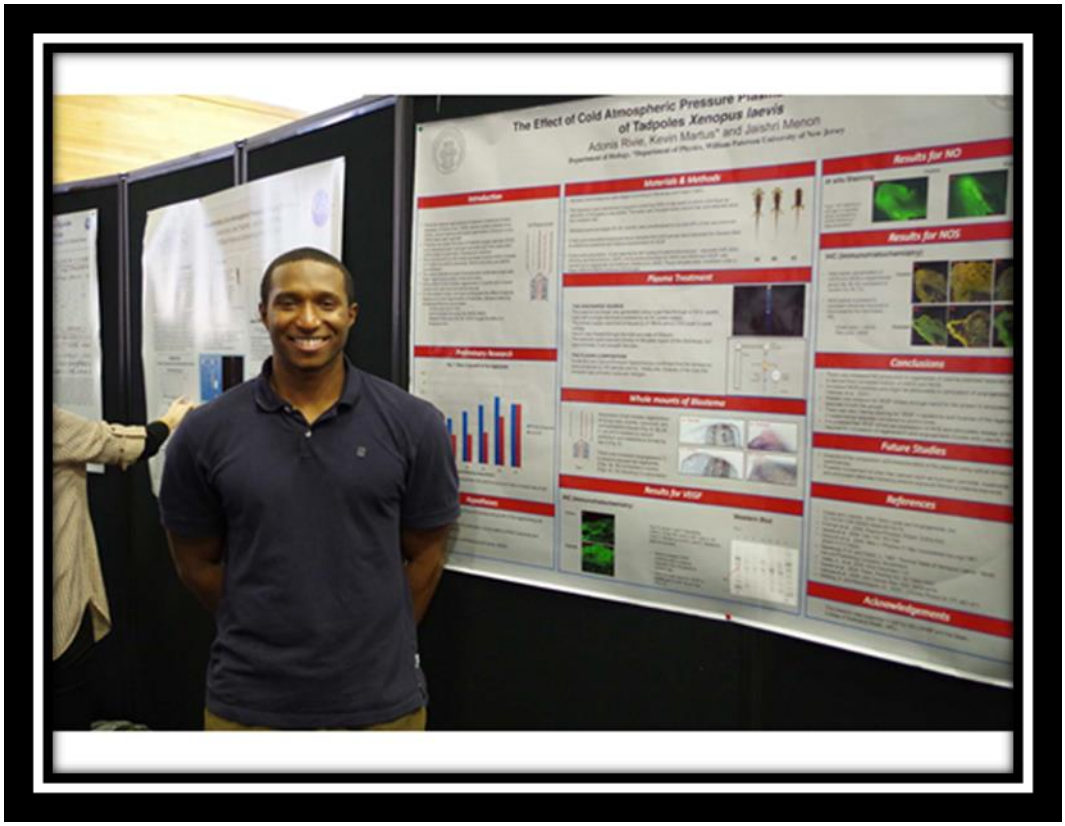
Bryan Gonzales, Dr. Griffiths, EVS

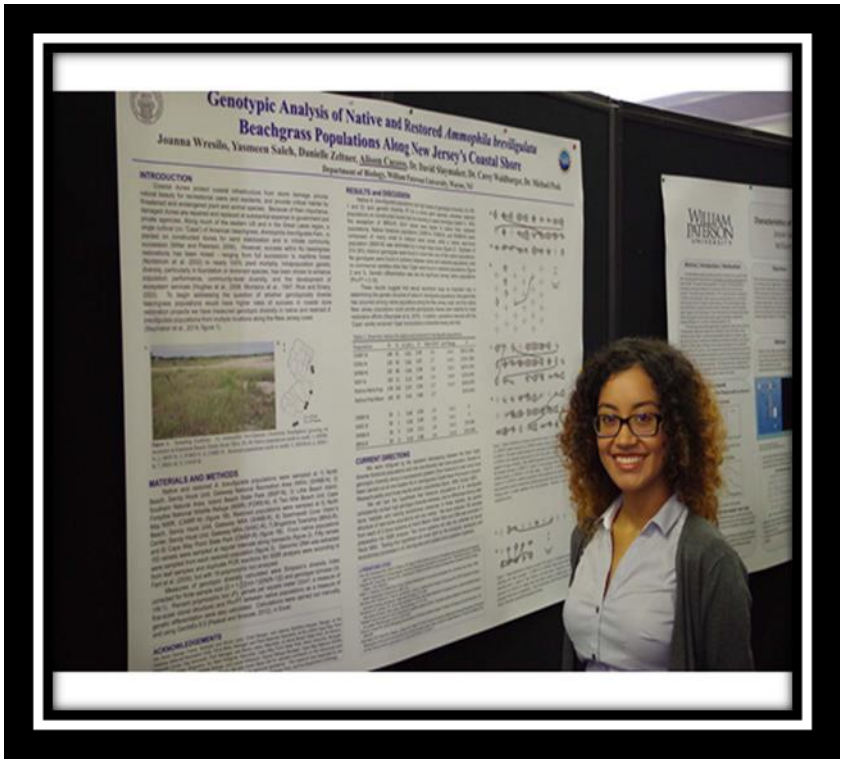
Daniel Pagano, Dr. Becker EVS

Harry M. Maisch IV, Dr. Becker, EVS

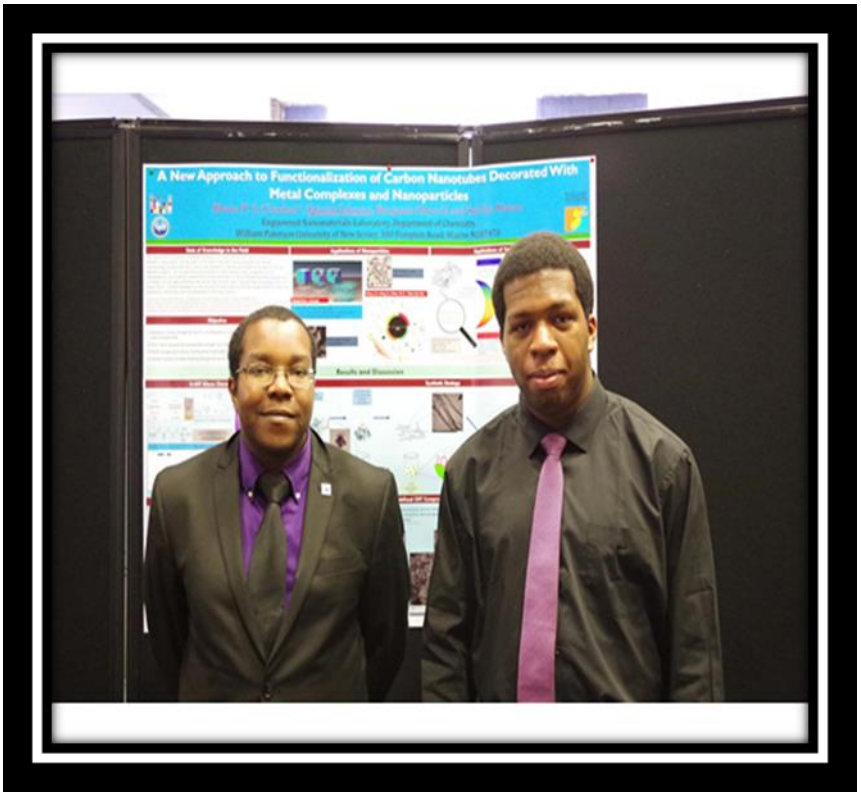
Ralph Scimeca, Dr. Becker , EVS

First Place Award to Adonis Rivie



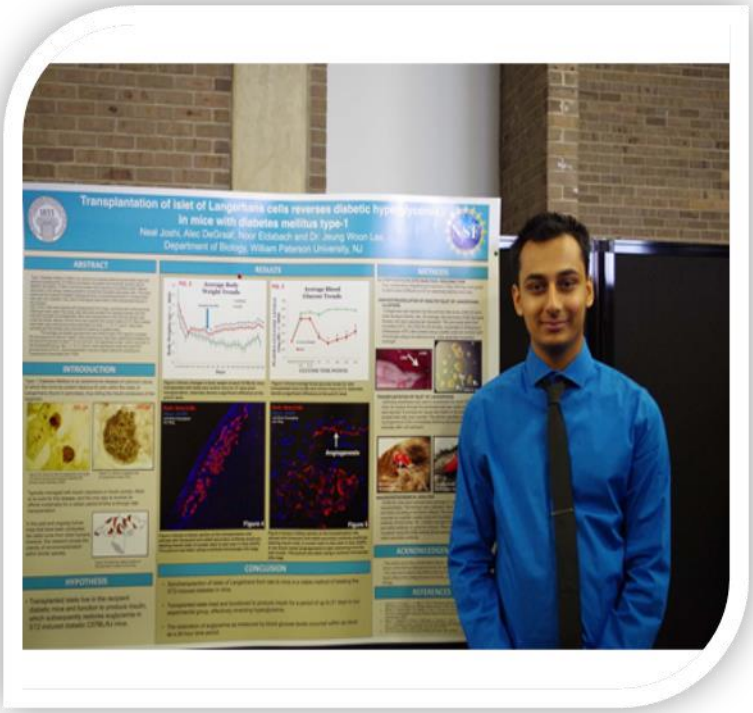


Alison Caceres

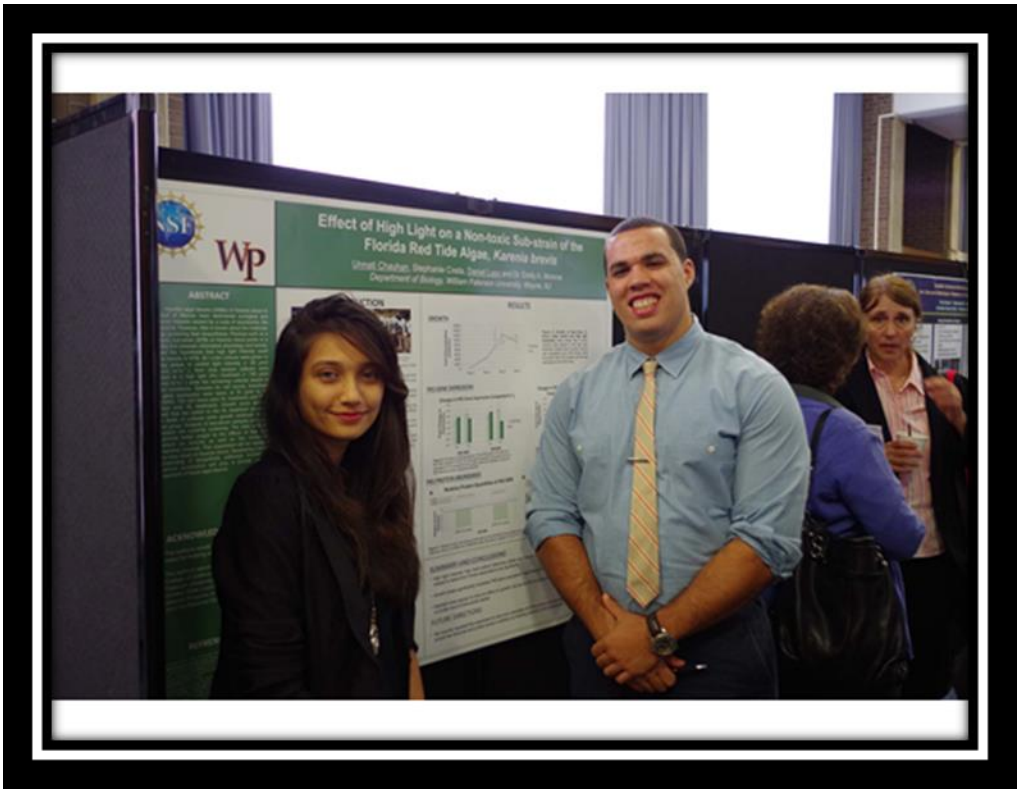


Qiaxian. Johnson AND Benjamin Onyechi,

Rebecca Atencio, Erin Connor, ,Unnati Chauhan and Daniel Lupo



Neal Joshi



Unnati Chauhan and Daniel Lupo

Associate Dean Fuller Stanley , Rita Levine with students

ADONIS RIVIE

Graduating Senior

ISSBB Scholar

GS-LSAMP Scholar

BBT President

Being recognized

For his ACHIEVEMENTS

By

Pam Ferguson,

Vice President

Institutional Advancement

January 28, 2015

SUN CHEMICAL TOUR

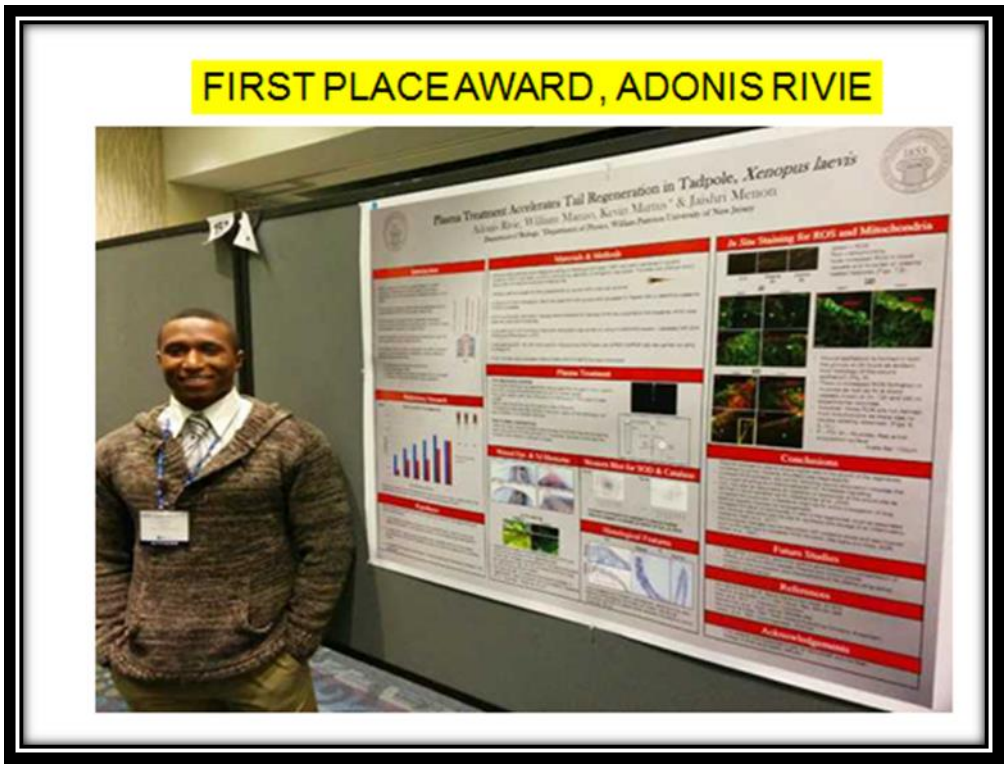
(left to right) - Benjamin Onyechi, Jonathan Gabriel, Bryant Catano, John Lee.....

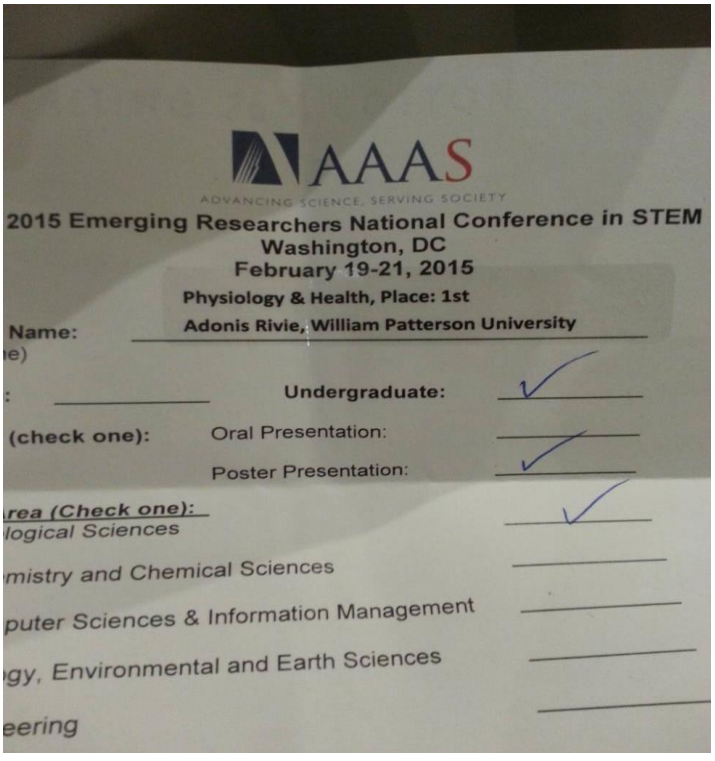
People missing: Aarti Patel, Dr. Xinbo Lau, Qiaxian Johnson, and Noor Eldabag.

Emerging Research National (ERN) Conference in STEM

Washington DC

February 19, 2015





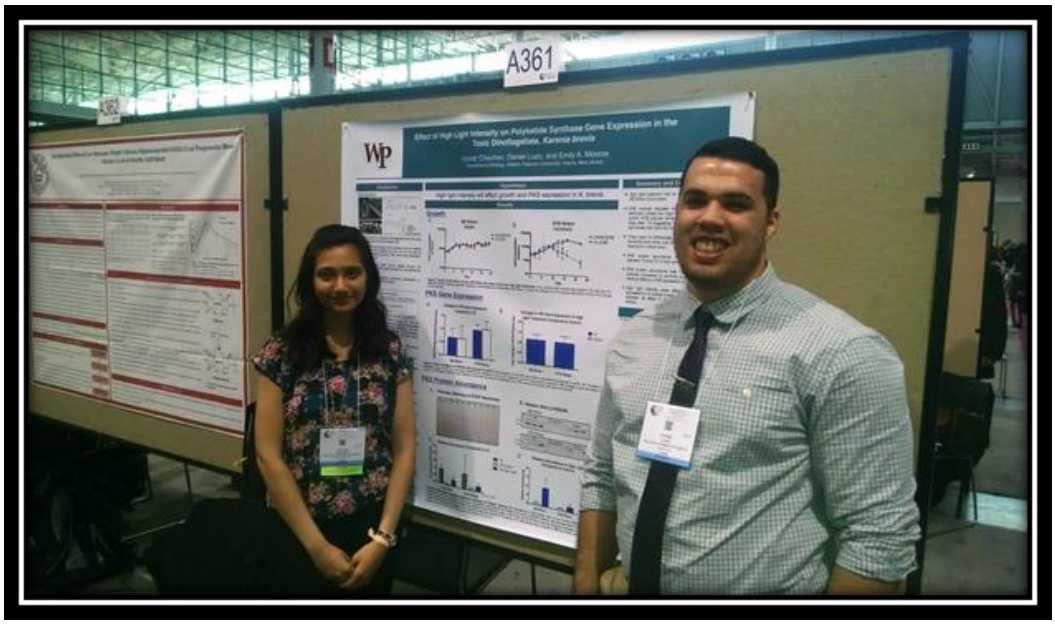
Experimental Biology/ASBMB meeting

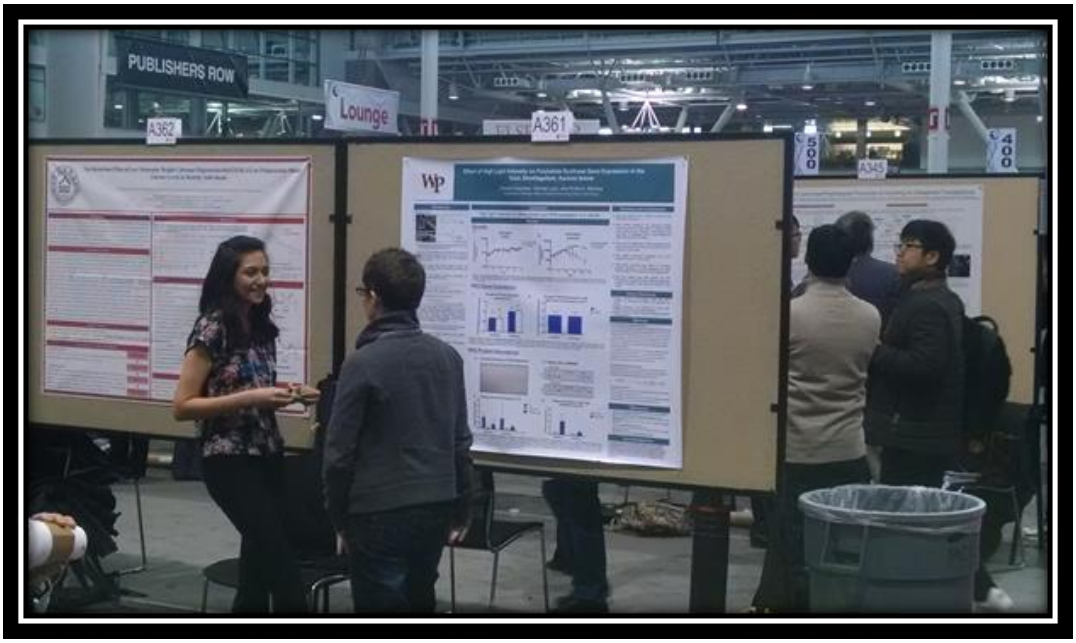
Boston, Massachusetts.

March 28- April 1, 2015

Unnati Chauhan and Daniel Lupo

Mentor: Dr. Emily Monroe, Biology





9th Annual Undergraduate Research Symposium in Biological Sciences

Saturday, April 11, 2015

Departments of Biology/Chemistry,

William Paterson University of New Jersey

List of Awardees from WPU

Behavior & Genetics I

1st Place: Erin Connor, Rebecca Atencio and Alec Degraff, WPUNJ.,
Honorable Mention: Eugene Dennis. WPUNJ

Material Chemistry

1st Place: Benjamin Onyechi. WPUNJ.

Ecology, Evolution & environmental Science

2nd Place: Bryan Gonzalez. WPUNJ.

Molecular Biology II

Honorable mention: Unnati Chauahn and Daniel Lupo. WPUNJ.

Behavior & Genetics II

Honorable mention: Devon Atkinson. WPUNJ.

Physiology

2nd Place: Alec Graff, WPUNJ.
Honorable mention: Adonis Rivie. WPUNJ.

Organic chemistry

1st Place: Bryan Catano, WPUNJ.

Nanochemistry

1st Place: Qiaxian Johnson. WPUNJ.

AWARDS IN BIOLOGY

1st Place: Erin Connor, Rebecca Atencio and Alec Degraff, WPUNJ.,

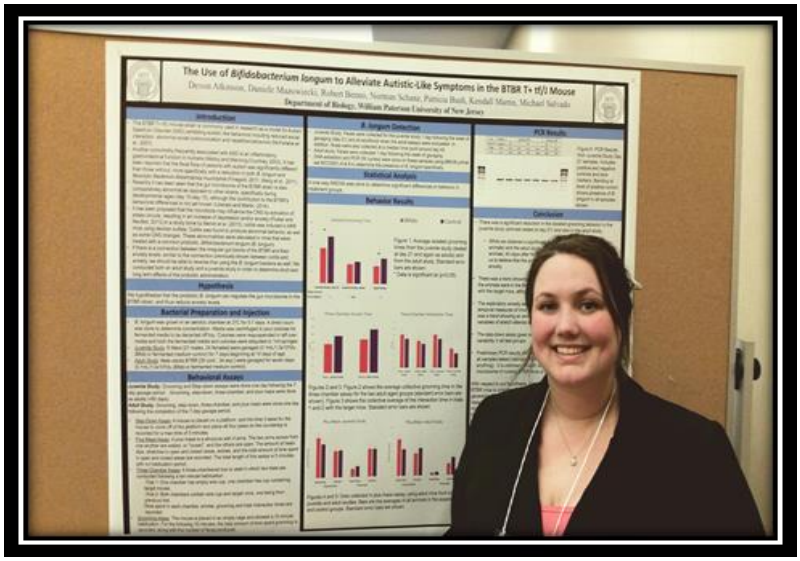
Honorable mention: Unnati Chauahn and Daniel Lupo. WPUNJ

Honorable Mention:

Eugene Dennis. WPUNJ

Honorable Mention:

Adonis Rivie. WPUNJ



Honorable Mention:

Devon Atkinson. WPUNJ

AWARDS IN CHEMISTRY

1st Place: Bryan Catano, WPUNJ.

1st Place: Qiaxian Johnson. WPUNJ.

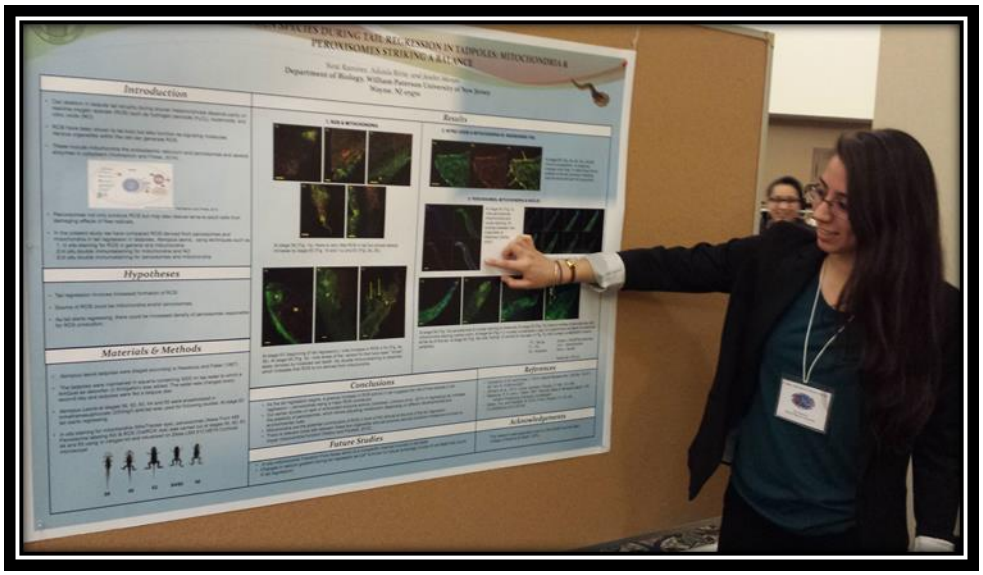
1st Place: Benjamin Onyechi. WPUNJ.

AWARD IN ENVIRONMENTAL SCIENCES

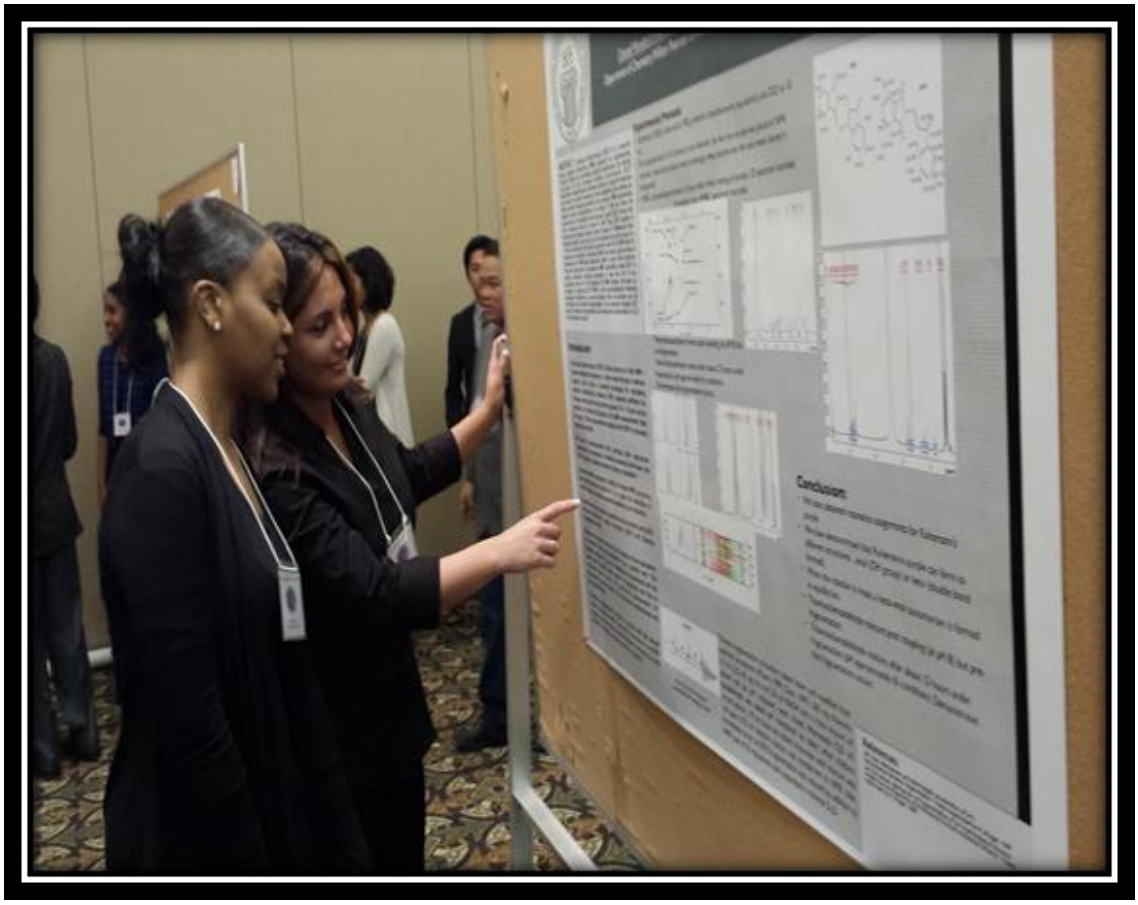
2nd Place: Bryan Gonzalez. WPUNJ.

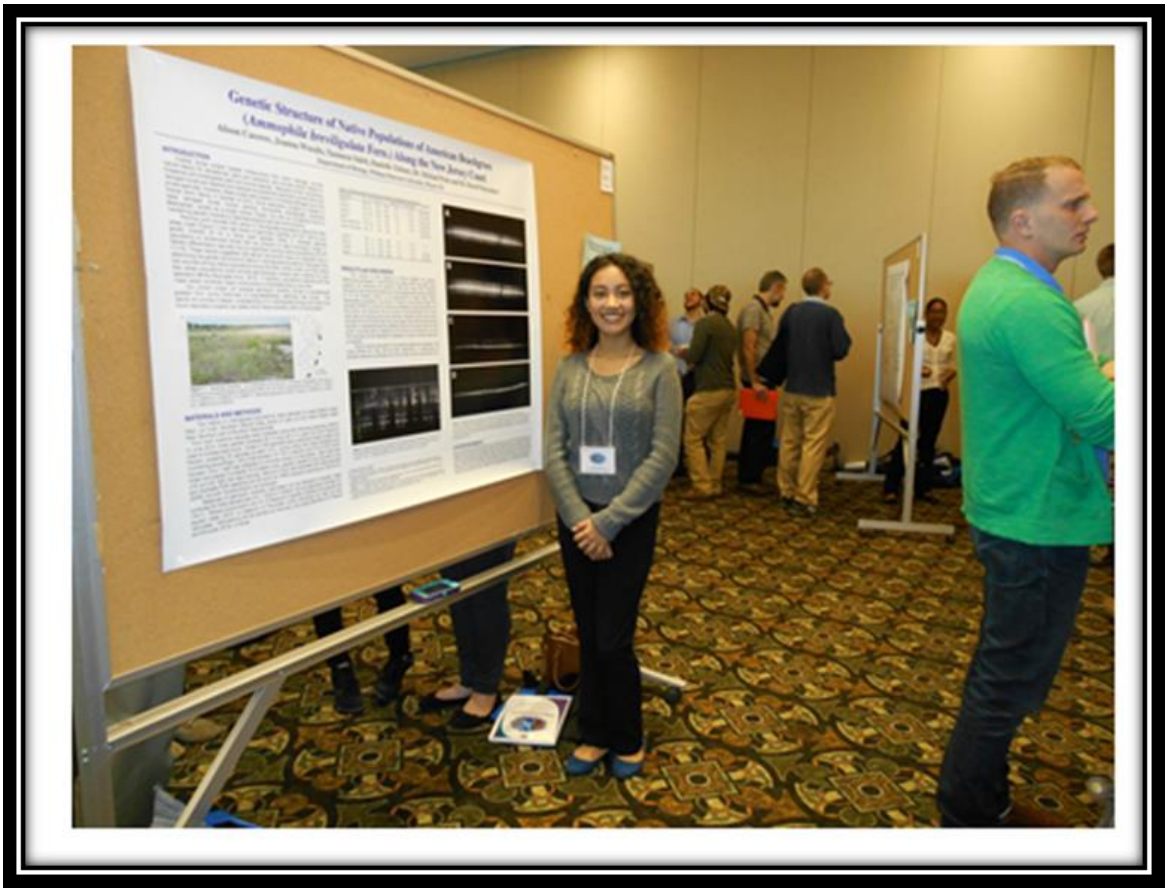
Bryan Gonzalez with the Dean of Science at the Bergen Community Stem Conference, April 17, at Bergen Community College

HIGHLIGHTS OF SYMPOSIUM




PYROAURITE – STRUCTURAL AND TEXTURAL CHARACTERISTICS AS A FUNCTION OF CATION COMPOSITION
Background
TEM and HRTEM


Conclusion


Genetic Structure of Native Populations of Asian Bordgrass
(Ammophila breviligulata Fern.) Along the New Jersey Coast

WILLIAM PATERSON UNIVERSITY OF NEW JERSEY

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