8-2014

2014 TSU Undergraduate Research Program

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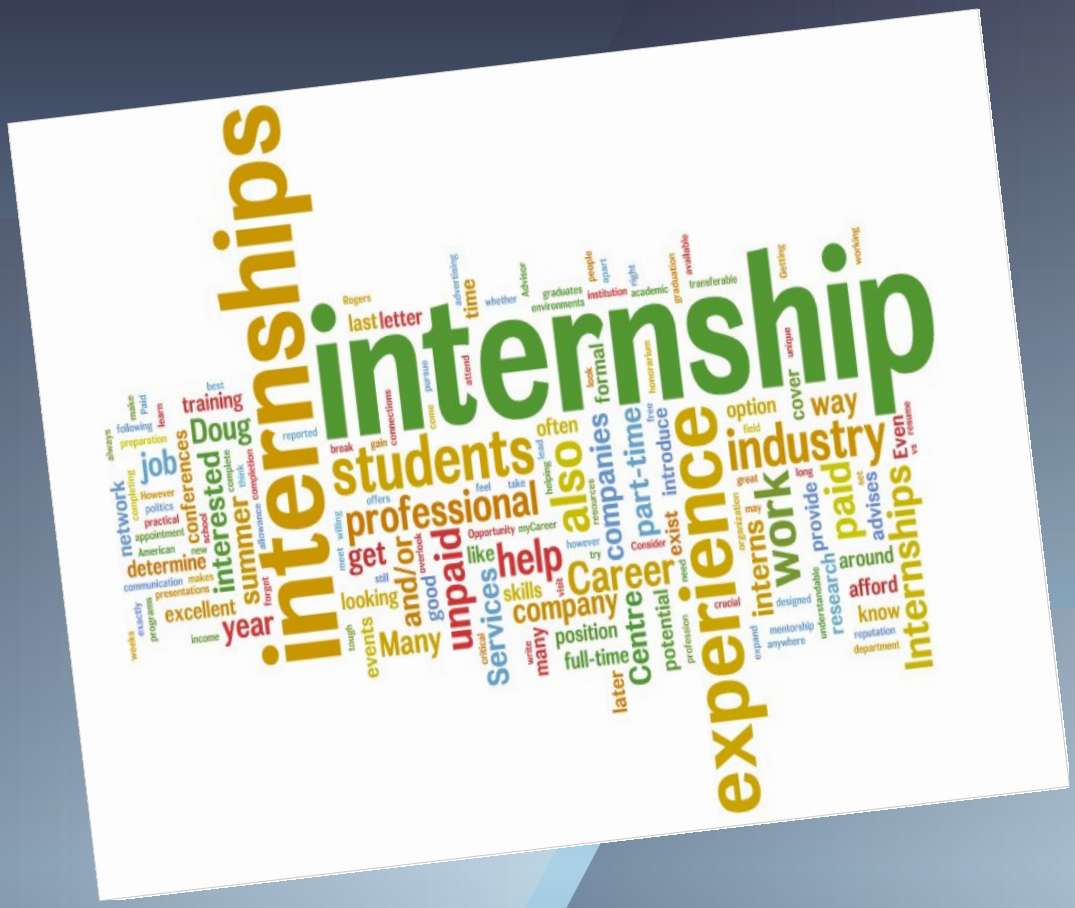
Texas Southern University



SUMMER RESEARCH PROGRAM

2014 Closing Ceremony

Thursday July 31st—Friday August 1st

Sponsored by The Office of Research , TSU's NASA University Research Center for Bio-nanotechnology and Environmental Research (CBER), The College of Science and Technology and NSF - RISE

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The Office of Research, the College of Science and Technology, NSF-RISE and the NASA Center for Bionanotechnology and Environmental Research (CBER) provided summer research experiences for students on the campus of Texas Southern University. The 9-week 2014 program began with an orientation on June 2nd followed by engagement of students in research and scholarship with TSU faculty mentors. The research ranged from biological and technological innovations to artistic creations and scholarly inquiry with local and national implications in the respective fields. Under the direction of faculty mentors, students majoring in science, technology, and/or pharmacy engaged in activities that involved hands-on basic research, training in laboratory techniques, academic research enrichment, and field work as applicable to specific fields. Similarly, students majoring in the humanities, education, social & behavioral sciences engaged in activities that involved formulating qualitative and mixed-methods research questions, training in research methods, and hands-on experience towards the creation and use of discipline-specific research tools.

This year, a series of workshops for student professional development was added. Topics covered included research design and lab report writing, responsible conduct of research, components of a manuscript, preparing oral and poster presentations, computational software utilization for scientific research, and preparation for graduate program applications.

The summer research program that began at TSU in 2010 with only 15 students has witnessed a tremendous growth with 89 students participating in the 2014 program. Coordinated by Dr David Owerbach, 39 students were supported by the Office of Research for the current year. Students were drawn from the College of Pharmacy and Health Sciences (14) and 25 from various departments including biology, chemistry, computer science, physics, transportation, engineering technologies, health science, psychology, sociology, political science, theater, administration of justice, business, sports medicine and communication.

The College of Science and Technology (COST) program was sponsored by Dean Lei Yu and coordinated by Dr. Hyun-Min Hwang. This was the second year that COST sponsored this program. A total of 19 students was supported in this year's program.

The NSF-RISE program, supported by a research grant from the National Science Foundation, is a new addition to the campus-wide initiative this year. The program supported 6 college and 5 high school students. Dr. Shishir Shishodia is the PI with Drs. Hyun-Min Hwang, Daniel Vrinceanu and Jason Rosenzweig as Co-PI's.

The NASA-CBER program, coordinated by Brandy Butler, provided stipends and workshops for 49 students who fulfilled the eligible criteria established by NASA. Six CBER undergraduate students and 14 graduate students presented posters.

The summer research experience concluded with student poster and oral presentations on Thursday, July 31st and Friday, Aug 1st.

2014 SUMMER RESEARCH CLOSING PROGRAMS

JULY 31, 2014

POSTER PRESENTATONS
THIRD FLOOR -STERLING STUDENT CENTER
9:00 AM—12 PM

ORAL PRESENTATIONS
NEW SCIENCE BUILDING , ROOM 156
1:00 PM—5:00 PM

AUGUST 1, 2014
NEW SCIENCE BUILDING , ROOM 156

ORAL PRESENTATIONS
9:00 AM—12: 00 PM
LUNCH
1:00 PM—2:00 PM

PRESENTATION OF CERTIFICATES
2:00 PM—3:00 PM

2014 SUMMER RESEARCH PROGRAMS

OFFICE OF RESEARCH UNDERGRADUATE STUDENTS

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COST UNDERGRADUATE STUDENTS

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CBER STUDENTS

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NSF-RISE STUDENT S

Pages 53 - 59

2014 OFFICE OF RESEARCH UNDERGRADUATE STUDENTS AND FACULTY MENTORS

Student	Department	Mentor
Simon Achu	Maritime Transportation	Maria Burns
Megan Alexander	Sociology	E. Diane Mosley
Ebonie Archer	Health Administration	Monica Rasmus/ Andrea Shelton
Juan Armaya	Physics	Daniel Vrinceanu/Carlos Handy
Zayne Belal	Physics	Mark Harvey
Tiffani Boston	Biology	Mario Holloman
Kiara Stephens-Brown	Psychology	Michael Sollars
Skyler Davis	Environmental Health	Zivar Yousefipour/Renard Thomas
Rachel Freeman	Theatre/English	Elizabeth Brown-Guillory
Temitope Gbaja	Engineering Technology	Graham Thomas
Sarah Glenn	Biology	Hyun-Min Hwang
Chastity Greene	Biology	Hector Miranda
Mayte Herrera	Transportation	Haiqing Sun
Erin Jones	Biology	Audrey Player
Robert Kaisand	Respiratory Therapy	Shirlette Milton
Brandon Lathom	Chemistry	Sonya Good
Quinton Leonard	Engineering Technology	Yachi Wanyan
Hailey McClenon	Biology	Ashraf Mozayani/Hector Miranda
Olivia Nguyen	Biology	Ya Fatou Njie-Mbye/Sunny Ohia
Andre Parrot	Computer Science	Lila Ghemri
Randy Paschal	Health and Physical Education	Jafus Cavil
Ana Sanchez	Political Science	Maurice Mangum
Alexander Torres	Chemistry	Mahmoud Saleh
Ashley Webber	Biology	Ya Fatou Njie-Mbye/Sunny Ohia
Raiven Williams	Business	Anthony Rodriguez

Student Biographies

Simon Achu was born in the seaside town of Buea in the southwestern coast of Cameroon. Before relocating to Houston, Simon was a national table tennis coach and Physical Education Teacher in Cameroon, where he mapped out a physical education curriculum in both national and private international schools. He has also volunteered as a freight forwarder while pursuing a Bachelors of Science degree in Maritime Transportation management and security. Upon graduation, Simon would love to work as a Ports Operations manager or a Ports Environmental Safety and Security officer, while pursuing a master's degree in the Maritime field. Simon has been a recipient of the Texas College Grant, the International Maritime Transporters Association Scholarship, and Maritime Departmental Scholarship of TSU. He is also a member of the Texas Southern University Maritime Student Association, a student member of the National Defense Transporters Association and a certified HAZMAT expert.

Meagan Alexander began her journey in higher education at The University of Texas at Austin, before transferring to pursue a major concentration in Sociology with a minor in art at TSU. A native Houstonian hailing from the Acres Homes community, she is set to graduate in the spring of 2015. She hopes to use her education to align herself with efforts whose primary focuses are to help those that are underrepresented, overlooked, or marginalized. When not encumbered with completing assignments and studying, Ms. Alexander enjoys cooking, reading, spending time with family, and volunteering her time at various non-profit organizations across Houston.

Ebonie Archer is a senior in the Health Administration program in the College of Pharmacy and Health Sciences at TSU. Her research experience includes research on various topics including *in vitro* fertilization, low birth weight in India and HSV II. She also was a participant in two clinical research studies.

Juan Armaya has **a**ttended TSU for the past two semesters and is majoring in physics and mathematics. Since his early childhood he has had a passion for science and mathematics. He is attending the summer research program to further his goals of becoming a physicist.

Zayne Belal is from Baytown, Texas and graduated from Baytown Sterling High School and then enrolled at The University of Southern California (USC) and graduated with a B.A. degree in economics. He entered TSU as a post-baccalaureate student in the summer of 2012 with the goal of pursuing a career in medicine. Currently, he is a post-baccalaureate student in physics at TSU and will begin the health physics program in the fall of 2014. Within the past year, he has completed the 2013 Summer Undergraduate Research program at TSU and also as presented his finding to the South Texas Chapter of the Health Physics Society. His ultimate goal is to enter medical school within two years and eventually become a physician specializing in the treatment and care of athletes, while also pursuing a PhD in biophysics.

Tiffani Boston is from Houston, Texas and is an undergraduate sophomore attending TSU pursuing her Bachelors of Science in Biology. She was inducted into the Thomas F. Freeman Honors College in the fall semester of 2013. She has been a member of the TSU Science and Technology Enrichment Program. Her goal is to become a psychiatrist.

Kiara Stephens-Brown was born in Gary, Indiana and began her collegiate career at Indiana State University. At TSU she is perusing a Bachelor of Liberal Arts in Psychology, with a minor in radio, television, and film from the School of Communications. She is currently in TSU's Honors Society and plays an active role in her community, holding several key leadership positions. She is a volunteer with TSU's Wesley Foundation mentoring and encouraging children at Lockhart Elementary. She is also a member of Brook Hollow Baptist church where she serves as an active choir member. She enjoys writing music, poetry, and staying active in the gym. Upon completion of her bachelor's degree, she plans to acquire a master's degree in Psychology.

Skyler Davis was born in a Amarillo, TX and is currently a senior in Health Science studying Environmental Health. After graduation she plans to pursue a master's degree in Toxicology at TSU. She has been instrumental in the reestablishment of the Environmental Health Club in which she Has taken on the Presidency for the club. She enjoys taking her dog to community parks, reading romance novels, watching movies and spending quality time with her family.

Rachel Freeman was born and raised in Houston. Texas. She is a sophomore majoring in Theatre with a minor in English. She has worked on every show that the theatre program has put on since she arrived at TSU. While her studies are more concentrated on the technical side of theatre, she is more interested in writing and directing plays. She aspires to be a Playwright and Play Director in the future.

Temitope Gbaja is a sophomore at TSU majoring in Electronics Engineering Technology. Her love for the advancement in technology increased as she grew up which encouraged her to pursue her dreams to make an impact in technology in the future. She likes to learn new things, which is one of her reasons for participating in the Summer Undergraduate Research Program. Upon graduation, she hopes to further her knowledge in Electrical Engineering by obtaining a PhD in a reputable institution and also head a research team. She is a member of the National Society of Black Engineers (NSBE). She loves to inspire people and hopes that one day she will contribute to making the world a better and a more comfortable place.

Sarah Glenn was born and raised in Ontario, Canada. She graduated from a small Catholic high school called St. Michaels in her hometown. Currently at Texas Southern University, Sarah is completing her bachelor's in Biology and is a member of the Women's Soccer Team. She is an active member of TSU Habitat for Humanity and the Beta Beta Beta Biological Honors Society. Sarah is looking forward to acceptance into dental school and to one day become an Orthodontist.

Chastity Greene is from Houston, Texas and is a second generation Texas Southern University Tiger. She is pursuing a Bachelor of Science in Biology, with a minor in Chemistry Chastity Greene is a part of several extracurricular activities on campus including The Collegiate 100 Black women of Texas Southern University, in which she is the President. She is also a member of the Thomas F. Freeman Honors College, Tri-Beta biological Honor Society, The National Society of Collegiate Scholars and Alpha Kappa Alpha Sorority Incorporated. She would like to pursue a medical degree to fulfill her dream of opening her own low-income clinic to serve the needs of those who cannot afford health care.

Mayte Herrera is a TSU undergraduate student who has successfully finished her second year of college. Mayte, being a native Latin American has always been attracted to the history behind her Latin roots. This is Herrera's second year participating on the Undergraduate Research Program at TSU.

Erin Jones was born and raised in Houston, Texas and is currently a junior at TSU majoring in Biology. She is a member of the Thomas Freeman Honors College, Collegiate 100 for Women, National Society for Collegiate Scholars, Health Occupation Students of America, Beta Beta Beta Delta Upsilon (Biology Honor Society), the Science Technology Enhancement Program and the Scholar College of Science Technology. She also has a job working in the Biology Department at TSU. She has volunteered in the AVON Breast Cancer Walk, helped out at the Houston Food Bank, and committed to helping out a local church, Agape Ministries. She plans to become a dental hygienist.

Robert Kaisand majors in Respiratory Therapy in the Department of Health Sciences at TSU. He had always been interested in the health care field, with 'doctor' and 'pharmacist' being on the top of his list. However, after his father passed away from a combination of respiratory diseases that he decided he wanted to be a Respiratory Therapist.

Brandon Lathom was born and raised in Houston, TX and is a senior at TSU. Brandon is majoring in chemistry and would like to pursue a master's degree in chemistry after completing his undergraduate degree. Brandon works with mentally challenged adults and he also mentors a little league team in his spare time.

Quinton Leonard is originally from Orlando, Florida and currently is a senior civil engineering technology major at TSU. After graduating from Allen High School in Allen, Texas, Quinton was accepted into the Honors College at TSU. Quinton is an active member of the Student-Athlete Advisory Committee (SAAC) as the representative and captain of the Men's Golf team. Quinton's main interests are transportation, highway design, and hydraulic engineering. His other interests include, but are not limited to automotive engineering, architecture, alternative energy, history, music and the arts. After graduation, he plans to pursue a Master's Degree in Transportation Studies.

Hailey McClenon is a senior majoring in Biology with a dual minor in chemistry and forensic science and plans to graduate in 2015. After graduation, she aspires to attend the Sam Houston State University master's program for forensic science, where she will work towards achieving her goal of becoming a forensic genetic analyst. During her time as an undergraduate student she has actively served as a member of the Collegiate 100 Black Women Organization, Student Government Association, Pre-Alumni Association, International Association for Identification, and Alpha Kappa Alpha Sorority Inc. Taking pride in the Third Ward community she has been a math and science tutor for Foster Elementary and a volunteer at the Houston Methodist Hospital.

Olivia Nguyen is a senior biology major attending TSU. She is a native Houstonian and also a first generation Texas Southern University student. She is actively pursuing a Bachelor of Science Degree in Biology and also a volunteer at Texas Children's Hospital. Earlier this year, Olivia received a travel fellowship from (FASEB-MARC) to attend a biology convention. She plans to ultimately obtain a medical degree. Her hobbies include photography and traveling.

Andre Parrott is a senior computer science major at TSU. Andre is a current member of the Thomas F. Freeman Honors College. In the summer of 2013, Andre had the opportunity to partake in a research experience at the University of Hawaii with Dr. Kim Binsted. He had the chance to implement a nutritional database for Hawaii Space Exploration and Analog Simulation, which allowed astronauts to log food consumption, discover food deficiency, and provide recipes to avoid food boredom. After completing his bachelor's degree, he plans to receive his master in computer science from TSU.

Alexander Torres earned an Associate of Science degree from Lonestar College before transferring to TSU, where he is currently a chemistry major. He had a passion for chemistry since his junior year of high school. After he completes his undergraduate degree, he plans to pursue a Doctorate of Pharmacy and work in research in the pharmaceutical science field.

Randy Paschal was born in Houston, Texas. Before he came to TSU in the Sports Management Program, he was enrolled at the University of Texas at San Antonio. After graduation he plans to attend law school for sports law.

Ana Sanchez is from Houston, TX and is pursuing a Bachelors of Arts in Political Science and Spanish from the College of Liberal Arts and School of Communications at TSU. Ana is also a member of the TSU Debate Team and the Pre-Law Society. She is also a member of Fifth Ward Church of Christ were she actively serves as a translator. She also devotes her time to volunteering at animal shelters and a non-profit clinic. After graduation, she would like to pursue a law degree to fulfill her ultimate goal of being a family and divorce lawyer.

Ashley Weber a junior at TSU is majoring in biology and minoring in chemistry. Prior to TSU, Ashley attended Westside and Jack Yates Senior High School. Ashley is a part of the Thomas Freeman Honors College and has run track for the lady Tigers track team. Last year was part of the summer research program and the experience encouraged her to join the program again this year. She does a lot of volunteer work in her community. She was a part of a very well known teen organization called Top Teens of America. Top Teens of America is an organization that helps teens to become well rounded successful young adults, and allows them to help out in their community. Ashley also volunteers at St. Mary's Catholic Church where she helps with the children's choir, annual bazaars, and festivals. Ashley likes working with younger kids on their volleyball skills and is hoping to become a volleyball coach for her former club team. Her plans after graduation are to obtain a master's and then a PhD.

Raiven Williams was born and raised in Bakersfield, California, and upon graduation in 2015 will be the second in her family to graduate from TSU. She recently transferred to TSU from Louisiana State University of Shreveport and now attends Jesse H. Jones School of Business pursuing her Bachelor of Administration in the concentration of Management Information Systems. She has received recognition for her academic excellence with Dean's List and Honor Roll standings and she is Treasurer in the Texas Southern Computing Society and a membership in the Computer Information Technology Student Organization.

Student Abstracts

Simon Achiri Achu.
Mentor: Maria Burns,
Evaluation of Oil Spill and Waste Containment in the Houston Ship Channel

The Houston Ship Channel transports huge amounts of goods and if not properly regulated chemical spills and illegal dumping can have severe environmental impacts. This study evaluates Maritime Federal policy (OPA 90) and how effectively OPA 90 affects spills in the channel. Data came from interviews of mariners, terminal operators and federal environmental mangers and from marine literature, and from the coast guard and Maritime Museum's. More than 61% of targeted population felt that their marine environment, although showing improvement, needs continued improvement with an increase in Port regulatory activities. Most terminal managers at the Houston Port's facility interviewed have a positive feeling about OPA 90 as a good policy of containing spills and other waste in the waterway, but they feel that more has to be done on air pollution. More than 70 % of shipping companies transporting LNG feel that the burdens of liability of accidental spills is bad for business and should be reduced. Data expenses in law suits, claims and cleanup of spills from the Coast guard and the National Pollution Fund Center shows a downward trend. Downward claim trends in oily spills and favorable opinions of major maritime managers indicate successes of the Oil Pollution Act containment objective. Our findings indicate the notion of Maritime transportation as the cleanest mode of transport and should be encouraged in US waterways. However, aging superstructures, high costs in technology and compliance may encourage mystery spills which may be poisonous to the marine environment and distort many livelihoods. Therefore, there is a need for constant monitoring along the channel with the use of high technology and security workers.

Ebonie Archer
Mentors: Monica Rasmus and Andrea Shelton.
The impact on Health Insurance Coverage the Affordable Care Act will have for students at a Historically Black University College"

This study focused on the perceptions of the Affordable Care Act amongst college students at a Historically Black College /University (HBCU). The two hypotheses tested were: 1) students will not have a full understanding of the Affordable Care Act, and 2) students pursuing health related majors will be more knowledgeable of the ACA compared to non-health related majors. Institutional IRB permission was requested for survey approval. The survey questionnaire was handed to students of all majors at TSU during the 2014 summer. The surveys were collected from the students immediately upon completion using the direct return method. Students at TSU were familiar, but not very knowledgeable of the Affordable Care Act. Students obtaining non-health related degrees were not as familiar with the ACA as students pursuing health related degrees. This research gives some insight into the Affordable Care Act and the perceptions of students at an HBCU. Since students in non-health related majors are not totally informed about the Affordable Care Act, it is recommended that information on the topic be incorporated somewhere in the core curriculum. For health related majors, the ACA is a predominant focus of healthcare; therefore, it is recommended that these students are refreshed on the ACA in several courses in order for them to stay abreast of changes as well as develop their competence in the policy strategies and protocols of the Affordable Care Act.

Juan Amaya
Mentor: Daniel Vrinceanu
Investigation of Nuclear Magnetic Resonance in Low Fields

The goal of this research was to investigate the efficiency of a NMR device that simply uses the Earth's magnetic field and to determine if quality and efficient NMR investigations can be obtained without the use expensive instrumentation. The experiment was calibrated and designed by using a magnetometer and the MonitorNoise macro in order to determine the best location, to set up a wooden stand for the Terranova Magritek EF spectrometer, with high degree of magnetic homogeneity and low electrical noise. By using a small electromagnetic pulse it was possible to manipulate polarized nuclear spin properties of water, isopropyl alcohol and boron trifluoride diethyl etherate. Our experiments successfully identified doublet markers of isopropyl alcohol, finding that the hydrogen in water shows up at 2230Hz, seeing the chemical signature of boron trifluoride diethyl etherate and getting 3-D images of an orange and a lemon. In conclusion this study showed that a compact Earth-field NMR device is sensitive enough to be able to perform at a level useful enough to explore many of the same areas as high field devices, but at a fraction of the

Zayne Belal
Mentor: Mark Harvey
Proton and Alpha-Particle Transport in Water at the Cellular Level using Monte Carlo Simulation Techniques

Water consists of roughly 70% of any human cell and thus, is a catalyst in many of the interactions that occur within the human body. The molecular constituents of water can breakup into ions (e.g., free radicals) when exposed to sufficiently high-energy radiations. Some of these charged ions are highly reactive and can pose severe risks for cellular damage. The purpose of this study was to model the underlying physics mechanisms contributing dose within the biological cell volume due to single particle irradiation of water using the Geant4 Monte Carlo Toolkit (version 9.6). Calculations were performed over a wide range of incident particle energies for a single proton (e.g., 0.001 – 100 MeV) and a single alpha particle (e.g., 0.100 – 100 MeV) within a volume of water consistent with the size and shape of a red blood cell. Predictions were obtained on multiple physical processes (e.g., elastic scattering, ionization, excitation, etc.) contiguous with each produced particle species. Our results show that elastically scattered electrons were produced frequently within the water volume at all depths and incident particle energies considered in this study.

Kiara Stephens-Brown
Mentor: Michael Sollars
Birth Order and Personality

Birth order plays a substantial role in a child's life, because the family is the first social system to which a child is exposed. Forty student subjects from TSU were surveyed and asked to report their birth order and perceived traits. A two-page survey consisting of 30 questions such as how reliable, conscientious, structured, cautious, controlling, and achiever oriented was employed. The hypothesis being tested was that birth order has an impact on personality. The initial analysis of survey results revealed that the hypothesis pertaining to the relationship between birth order and personality was not statistically significant. These findings do not exclude that psychological birth order may in fact play a significant role in personality. Larger numbers of subjects must be studied and other possible factors that contribute to personality traits and birth order must be investigated. It is important for psychologists to understand and acknowledge every individual client in their entirety, in order to make an effort to make progress and empower clients to achieve their goals.

Tiffani Boston
Mentor: Mario Hollomon
Effect of Autophagy Inhibition on Anticancer-Induced Cytotoxicity in Osteosarcoma

Autophagy is a process that assists with the maintenance of cellular homeostasis. Autophagy induction is also a survival mechanism during periods of nutrient starvation. Depending on the context, autophagy induction can increase or decrease anticancer drug efficacy. Anticancer drug-induced autophagy is not well characterized in osteosarcoma (OS). In this study, we investigated the impact of autophagy inhibition on camptothecin (CPT)- and gemcitabine (GCB)-induced cytotoxicity in OS. The Krib metastatic human OS cell line was used in this study. Lentiviral shRNA directed against the essential autophagy protein, ATG5, was used to inhibit autophagy in the Krib cell line. Krib cells receiving lentivirus containing no shRNA served as the wildtype Krib cell line. Immunoblot detection of ATG5 protein by Western blot was carried out to confirm the knockdown of the ATG5 protein. Following autophagy inhibition, wildtype and autophagy-inhibited Krib cells were treated with CPT and GCB and the effect of CPT and GCB on metabolic activity was determined by MTT assay. Immunoblot detection of caspase-3 by Western blot was carried out to assess the presence of apoptosis. Microscopy was used to assess CPT- and GCB-induced cell death. Both CPT and GCB had cytotoxic effects on the Krib cell line. Both CPT and GCB induced caspase-3 activation. Camptothecin-induced cell death was greater than that of GCB-induced cell death. Autophagy inhibition increased the sensitivity of Krib cells to GCB. The results of this study indicate that both CPT and GCB can induce cell death in Krib OS cells. Activation of caspases-3 indicates that apoptosis was involved in the CPT- and GCB-induced cell death. The results suggest that Krib cells are more sensitive to CPT than GCB. Inhibition of autophagy through lentiviral-mediated knockdown of the autophagy protein, ATG5, increased the sensitivity of Krib cells to GCB, suggesting that autophagy may play a role in protecting the Krib cell.

Temitope M Gbaja
Mentor: Graham Thomas
Generation of Electricity Using Vibration

The expansion of economic activities globally has placed great demands on natural resources. The global economic expansion has contributed significantly to the increase use of fossil fuels such as petroleum products, coal and natural gas. These resources are not infinite in quantity therefore; globally we are faced with the depletion of easy to access petroleum oil. The large demand placed on these resources and dwindling supplies has resulted in high prices for fuel. This research looks at an alternative way of producing energy using vibration to expand and contract a volume of air which will move a wire coil through a magnetic field, the field will induce an electric current to flow through the coil. In this research, it was deduced that 55 turns of coil is the optimum number of turns needed in the magnetic field to generate the highest voltage. Also, bigger magnets and stronger vibration generates faster motion within the magnetic field. The more powerful the magnets, the stronger the magnetic field: Which generates more voltage. This research indicated that electricity can be produced by the contraction and expansion of a volume of air using electromagnetic induction. Due to the high demand placed on traditional sources of energy, in the future it is expected that most parts of the world will be using some form of an alternative energy source. it is hoped that consideration will be given to a source such as the one discussed in this research because of its durability, renewability and its friendliness to the environment.

Chastity Greene
Mentor: Hector C. Miranda Jr.
DNA Sequence Divergence of Cynocephalus volans, Philippine colugo, and their Phylogenetic Relation to Primates Based on Complete Mitochondrial Genomes

Colugos, or flying lemurs, are one of the most enigmatic and unique mammals of the world. Recent molecular studies have been ambiguous, with its placement either sister to primates with prosimians basal to the clade, or the dermoptera basal to the prosimian-primate sister clade. To determine which hypothesis is correct, we are sequencing the mitochondrial genome of a colugo species for which the genome has not been previously sequenced. A set of 23 dermoptera specific primers were designed and 16 of the total 23 contigs, or fragments, each about 900 bases long have been sequenced. This comprises approximately 70% of the total mitochondrial genome. Based on our distance – based phylogenetic analysis using the HKY model of molecular evolution, the colugo is sister to anthropoideans, with prosimians basal to the colugo-anthropoidea clade. Our findings support the gliding colugo-primate sister hypothesis and that colugos are our long – lost gliding cousins.

Mayte Herrera
Mentor: Haiquing Sun
Re- Approaching Afro- Hispanic Culture Through Works by Gloria Rolando

Gloria Rolando has directed and produced several documentaries on the lives of Afro- Hispanics from the Caribbean. The aim of this research is to re- approach Afro-Hispanic culture through the works of Gloria Rolando. All works by Gloria Rolando were studied. Peer reviewed articles and published interviews were analyzed. One interview was conducted during the research by Dr. Haiquing Sun in Habana Cuba and responses were taken as first hand sources of information on which Rolando explained that the main purpose of her works is to show the world the soul of an Afro-Hispanic community from the Caribbean. The comparisons made after choosing and reading Rolando's projects from the twentieth century to the twenty- first show how her focus and methodology changed from showing the essence of the Afro-Hispanics to portraying more of their history on her films. Gloria Rolando has been a great influence to Afro- Hispanics on Latin America; she has been able to direct a significant number of films on the life, culture and history of African American groups in all of America as well as the Caribbean Islands.

Erin Jones
Mentor: Audrey Player
Identifying Genes Related to Breast Cancer

Breast cancer is a malignant tumor that begins in the cells of the breast. It consists of a group of cancerous cells that can eventually grow and invade the surrounding tissues, metastasizing to distant areas of the body. Metastasis indicates that the tumor is aggressive. Breast cancers are caused by many different factors and some are found to be more aggressive than others. The more aggressive cancers are most likely triple negative. Triple negative (TN) cancers are negative for three genes, Estrogen Receptor (ER), Progesterone receptor (PR) and HER2. The purpose of this study was to distinguish the genes in aggressive vs. less aggressive cancers. We analyzed aggressive vs. less aggressive patient samples looking for markers. The T-test was used to differentiate the genes associated with the aggressive vs. less aggressive cancers. The RNA levels were analyzed by performing Polymerase Chain Reaction (PCR). Six genes were chosen and tested with the PCR and out of the six genes FOXQ1 was the best candidate. FOXQ1 is a transcription factor that is found in the nucleus. We found that FOXQ1 was higher in aggressive compared to less aggressive and might be useful as the marker.

Robert Kaisand
Mentor: Shirlette Milton
An Interprofessional Activity with Health Professions Students to Increase Awareness of Health Disparities, Bioethics, and the Role of Health Professionals

Interprofessional Education (IPE) is described as occasions where students from two or more professions learn with, from, and about each other to improve collaboration and the quality of care. Studies have indicated that students undertaking IPE have an increased amount of knowledge of their own profession, as well as the professions of other health professionals and work more efficiently as practitioners within a health care team to improve patient outcomes. The objective of this research is to conduct a pilot project, to expose students in health professions at TSU to concepts of healthcare disparities, bioethics, and the role of health professionals through a common reading experience that will assist in the design of interprofessional activities in the curriculum. The book selected for the study, "The Immortal Life of Henrietta Lacks" has been adopted as a common reading experience by over 150 colleges across the country. A total of 142 students were enrolled in the study, with disciplines representing 85% pharmacy and 15% health sciences. Students participated in a pre-test and Readiness for Interprofessional Learning Survey (RIPLS) for assessment prior to lectures on health disparities, bioethics and interprofessional education. Evaluation of the lectures and a Book Readiness Test were completed prior to discussion of the book which included applications to practice and an interprofessional group activity. Pre-test results indicated that 63% of students were not knowledgeable of a landmark bioethics case and 69% could not distinguish between health and healthcare disparities. Students (54%) indicated lack of knowledge of the roles and responsibilities of students outside their discipline. The RIPLS indicated that students (98%) would welcome the opportunity to work with other health students. The majority of students indicated a better understanding of the principles of bioethics (92%), disparities (96%) and interprofessional roles and responsibilities (90%) as a result of the lectures and felt that these areas should be incorporated into their program of study. Book Assessment indicated that 64% of students read 50% or more of the book with test scores ranging from 20%-80% (mean=49% +/- 16%). Students gained knowledge regarding health disparities, bioethics and the role of health professionals and indicated readiness for IPE. IPE activities can be conducted through a common reading experience of the referenced book.

Brandon J. Lathom
Mentor: Sonya C. Good
A Preliminary Study: Surface Modification of Cellulose with Ionic Liquids

This study investigates and characterizes the surface properties of modified cellulose using phosphoric acid and potassium hydroxide. The cellulose samples from the cotton family were treated with 10 % phosphoric acid and 10 % potassium hydroxide respectively at 100 °C for one hour. The initial appearance of the cotton samples after treatment with each media indicates that a reaction occurred due to visible color change. The images from scanning electron microscopy (SEM) demonstrate that surface degradation of the fibers occurred when small pits formed on the surface. These analyses indicate that the cellulose is primed for surface modifications due to its conformation changes. Further analyses are planned to confirm the surface transformation with thermogravimetric analysis (TGA). This preliminary study will contribute to additional research with 1-butyl-3-methylimidazolium chloride, an ionic liquid.

Quinton Leonard
Mentor: Yachi Wanyan
Knowledge Based Expert System for Comparing and Selecting Appropriate Artificial Intelligence Tools in Solving Civil Engineering Problems

For many years civil engineering practitioners have utilized artificial intelligence (AI) to solve theoretical and practical cases successfully in the sub-disciplines of: transportation engineering, hydrology and environmental engineering, structural analysis and design, and construction planning and management. However, selecting the best suited AI method to solve the respective problem is a complex problem by itself. Various artificial intelligence tools are used depending on the particular situation that they are called for. Selection varies depending on the need to: optimize, predict, simulate, schedule, detect patterns, etc. The existing commonly used tools include evolutionary computing (genetic algorithms, particle swarm optimization, swarm intelligence etc.), fuzzy logic, knowledge based systems (KBS), expert systems, multi-agent systems, artificial neural networks (ANNs). With all of the different techniques that can be used to go about solving a civil engineering issue it is imperative that the correct tool is chosen to optimize results and to save time. Different artificial intelligence tools were gathered and categorized. A simple knowledge-based expert system regarding golf playing strategy selection was developed to demonstrate the feasibility of the proposed strategy.

Alexander Torres
Mentor: Dr. Mahmoud Saleh
The Harmful Volatile Organic Compounds given off by Incense

A comparative study of 18 commercially available incenses was done for their chemical constituents before and after burning as well as their effect on indoor air quality. Many of the volatile organic compounds (VOC's) produced upon burning incenses may promote free oxygen radicals and causing oxidative stress. Incense chemical analysis prior to burning was analyzed using head space gas chromatography mass spectrometry (HSGCMS). Volatile chemicals in the fumes were collected using Coldfinger extraction and analyzed for the presence of VOC's by Q-TOF/GC. Several VOC's were detected from preliminary analysis using NIST, National Institute of Standard Technology, library comparative search software: 2,2,4,4-tetramethyl-6-(1-oxo-3-phenylprop-2-enly) cyclohexa-1,3,5-trion, p-xylene, octadecane 3-ethyl-5-(2-ethylbutyl), 1H-indene, 1-methylene, ethyl benzene, acetic acid, phenylmethyl ester, and 1(2H)-naphthalenone, 3,4-dihydro. In addition thermogravemetric analysis revealed the formation of several poly aromatic hydrocarbons.

Hailey McClenon
Mentors: Ashraf Mozayani and Hector Miranda
Mitogenome Alignment, Translation Analysis, tRNA Secondary Structure Inference and Annotation of the Malayan Peacock-Pheasant (Polyplectron malacense)

The whole mitochondrial genome of the Malayan Peacock-Pheasant (*Polyplectron malacense*) has been sequenced. However, it needed to be characterized, annotated and checked. Using a plethora of powerful bioinformatics applications, we were able to; 1) establish the exact positions of each of the 13 protein-coding genes, the number of amino acids per gene, 2) identify the start and stop codons. We were able to identify a frameshift mutation (skip of 1 bp) in one gene nd3. The exact open reading frame was established in Expassy. The cloverleaf secondary structure of the 22 transfer RNA was also established using tRNA-Scan-SE. The complete mitochondrial genome of the MalayanPeacock-Pheasant *Polyplectron malacenses* is 16,694 bp and contains 13 protein-coding genes, 2 rRNA genes, 22 tRNA genes and one control-region. All protein-coding genes use the standard ATG start codon, except for *cox1* which has GTG start codon. Six out of 13 PCGs have TAA stop codons, one has AGG (cox1), two with TAG (cox2 and nd3), and three PCGs (*nd2*, and *nd4*) have incomplete stop codons of just T- nucleotide.

Olivia Nguyen
Mentors: Ya Fatou Njie-Mbye and Sunny E. Ohia
Involvement of Prostaglandins in the Pharmacological Actions of L-Cysteine in Isolated Bovine Irides

The substrate for hydrogen sulfide (H_2S) biosynthesis, L-cysteine can exert pharmacological actions in ocular smooth muscles, an effect that can be blocked by cyclo-oxygenase (COX) inhibitors. In the present study, we tested the hypothesis that H_2S (using L-cysteine as substrate) can interact with the pathway leading to the biosynthesis of prostanoids, in particular prostaglandin E_2 (PGE_2) in the isolated bovine irides. Isolated bovine irides were incubated in oxygenated Krebs buffer for 30 mins, prior to treatment with different concentrations of L-cysteine and norepinephrine (NE) which served as the positive control. After termination of reactions, the media were collected and stored for PGE_2 analysis. Tissues were homogenized in buffer containing 0.1M phosphate (pH 7.4) and the COX inhibitor, indomethacin (10 µM). The homogenates were then boiled, centrifuged, and supernatant collected for PGE_2 analysis using the EIA kit. The tissue pellet were prepared for protein determination by the method of Bradford. In bovine tissue homogenates, L-cysteine (10 nM) produced a significant ($p< 0.05$) increase in PGE_2 concentrations over basal levels. Likewise, 10 µM of L-cysteine produced an increase in PGE_2 levels in the incubation media indicating a washout of prostanoids from tissues exposed to L-cysteine. The positive control, NE (1µM) also caused a one-fold increase in PGE_2 concentrations over basal levels in bovine irides. L-cysteine can increase prostaglandin production in isolated bovine irides affirming a role for these autacoids in the pharmacology of H_2S in the eye.

Andre Parrott
Mentor: Lila Ghemri
A User Centered Approach to Managing Identities in Online Social Networks

Since the introduction of Facebook, the popularity of social networking sites has grown exponentially over the years, encompassing millions of users. As social networks continue to grow and become more popular, users different social circles (friends, family, colleagues) may collide, as they all coexist under the same infrastructure. Considering the different levels of relationships between a user and their social circles, concerns about privacy arise. How does a user conceal private data? Who has access to it? And what is the most effective way in managing that? This research is aimed at reducing the risk of disclosure by allowing a user to create multiple profiles, ultimately limiting access to certain information based on the social group viewing the data. In this work, a new framework is proposed in which a user can create several profiles, each representing one digital persona and add friends or acquaintances to a profile. In addition, a user's postings or comments will be made through a profile. This separation, we believe, will allow a user a better control of their privacy and more freedom in posting without fear of disclosure to an unwanted audience. The first step of our work was to reproduce the Facebook platform including user account creation and profile definition. This was the initial step in the process to better understand the interactions between the various parts of the system so that they can be maintained under our new design.

Ashley Webber
Mentors: Ya Fatou Njie-Mbye and Sunny E. Ohia
Pharmacological Actions of L-Cysteine in Isolated Porcine Irides

Hydrogen sulfide (H_2S) donors, such as sodium hydrosulfide and its substrate, L-cysteine have been shown to exert pharmacological actions on ocular smooth muscles. While L-cysteine has been reported to relax pre-contracted bovine and porcine irides, its mechanism of action is unknown. **The** goal of this study is to examine the mechanism of action of H_2S, administered as L-cysteine on porcine isolated irides. Porcine ocular muscle strips were mounted in organ baths containing oxygenated Krebs buffer (pH 7.4, 37º C). Changes in longitudinal isometric tension were recorded and analyzed via Force-displacement Transducers. Effects of L-cysteine on carbachol-induced tone were studied in the presence of enzyme inhibitors for H_2S biosynthesis [AOA; cystathionine β-synthase (CBS) inhibitor, PAG; cystathionine γ-synthase (CSE) inhibitor], and prostaglandin pathways [flurbiprofen; cyclo-oxygenase (COX) inhibitor]. L-cysteine (30 nM-1mM) evoked a concentration-related relaxation of carbachol-induced tone in porcine irides. Flurbiprofen (3 μM) caused a significant ($p < 0.05$) enhancement of relaxations induced by L-cysteine. On the other hand, both AOA (30 μM) and PAG (1 mM) antagonized the relaxations elicited by L-cysteine. The H_2S substrate, L-cysteine can relax pre-contracted porcine irides, an effect that is dependent upon the endogenous production of H_2S in this tissue. Furthermore, the ability of L-cysteine to relax porcine irides could be dependent, at least in part, on the intramural biosynthesis of inhibitory prostanoids.

Raiven Williams
Mentor: Anthony Rodriguez
Using Technology for Stakeholder Involvement in Promoting Urban Forestry and Sustainability Concerns Within the Institutional Space: The Case of Texas Southern University

The TSU campus with its infrastructure, 47 buildings, and over 10000 users sitting on 150 acres provides more than academic training. The campus is also an ecosystem comprised of a variety of fauna and flora. The campus has been assess for its sustainability potential in relationship to power consumption, but it has never undergone a study of its overall urban canopy value and its connection to the overall unbuilt urban ecology. In this study, we embark to find out if users are equally concerned with the natural and sustainability issues within this institutional setting similar to households in a residential setting. Furthermore we set out to provide information portals to both share and collect data using advanced technologies. After assessing the overall metrics on the campus, key points were selected using ARCGIS to identify potential clusters and nodes of greater natural sensitivity. We conclude that these clusters and nodes can stimulate both flora and fauna with limited human interjection and provide points of community connection. We concluded that technology has a place in the sustainability conversation within a campus/nonprofit institutional sector, to exert intellectual influence that can serve as a means towards protection of environment and promotion of alternative ways of doing the same.

Randy Paschal
Mentor: Jafus Cavil
An Inspection of the Commoditization and Branding of African American (HBCU) Male Athletes through the lens of the Marketing Mix

In recent years, Historically Black Colleges and Universities' athletic programs have experienced significant challenges. Many factors contribute to this, but two critical areas of focus are low academic progress rates (APR) at the Division I level, which has a direct connection to the graduation rate, and the second the lack of marketing the brand of HBCU athletics based on the economics and cultural identity of the HBCU Diaspora. Marketing is a complex function that is extremely important to the overall success of a sport organization. The marketing mix consisting of product, price, place and promotion in HBCU's, do not add up to what these of major collegiate schools. This research explored the historical significance of HBCU athletics, their current state, and future recommendations for success both on and off the court/field. From an analysis of the literature, a synthesis of key themes was developed to enhance collective and individual brand and positive outcomes for its educational stakeholders.

Ana Sanchez
Mentor: Maurice Mangum
Testing Competing Theories of White Opinions toward Affirmative Action and Preferential Hiring and Promotion

This article seeks to explain why some white Americans support affirmative action and while others do not. Unlike most studies that examine white opinions by testing one or two theories, we examine the determinants of white opinions by testing several competing theories and hypotheses simultaneously (social identity, racial discrimination, racial resentment, and realistic group conflict theory). Much of what has been written on white opinions on affirmative action is from an oppositional lens. This analysis seeks to add balance to the ways political science understands white opinions toward affirmative action. In so doing, this study identifies correlates of support for affirmative action not just rationales for opposition. Using data taken from the 2004-2005 National Politics Study, we find that many whites support affirmative action to combat racial discrimination experienced by racial minorities. However, we also find that many whites oppose affirmative action due to a sense of entitlement and privilege.

2014 PHARMACY STUDENTS AND FACULTY MENTORS

Student	Mentor
Nneoma Agwu	Ya Fatou Njie-Mbye/Sunny Ohia
Nneamaka Ajaero	Amruthesh Shivachar
Stanley Azubike	Ashraf Mozayani
Minh Do	Kasturi Rangana
Sona Doshi	Selvam Chelliah
Oluchi Juliet Emelogu	Uche Anadu Ndefo
Oluwaseyi Fasiku	Ya Fatou Njie-Mbye/Sunny Ohia
Jessica Guastadisegni	Joshua Swan
Rachel Le	Dong Liang
Esther Okoro	Ya Fatou Njie-Mbye/Sunny Ohia
Uyen Uyen Tran	Tyrone Felder
Lilia Vera	Edward Bell/Dong Liang
Reina Vera	Flora Estes
Harris Yango	Sondip Mathur

Student Biographies

Nneoma Agwu is a 2nd year Pharm.D candidate, at the TSU's College of Pharmacy & Health Sciences, in Houston Texas. She studied for her pre-pharmacy course work at Texas Southern University and also San Jacinto College South in Houston Texas. She is a certified pharmacy technician. She was born in Eastern Nigeria. Growing up in this part of the world where healthcare and drug therapy was limited, she developed a passion for healthcare. Hence, the field of pharmacy became her choice of career. She also has a strong interest in pharmaceutical research to understand and explore potential effects of several agents on different disease states. Her goal is to become a caring and adept pharmacist. She is also part of several student organizations and currently the secretary of Student National Pharmaceutical Association, TSU chapter. Some of the things she enjoys include spending quality time with family, meeting new people, traveling and gardening.

Nneamaka Ajaero was born in Nigeria, West Africa. She pursued an Associates of Sciences degree in biology at City University of New York – Bronx Community College New York (CUNY-BCC) where she received various Scholarships such as the National Science Foundation Scholarship, CUNY- Bronx scholarship, Barnes and Nobles scholarship, just to name a few. She is currently a second year student of the Doctor of Pharmacy program at TSU's College of Pharmacy and Health Sciences. Upon graduation, she hopes to complete a residency in Hospital Pharmacy and ultimately become a Board Certified Pharmacotherapy Specialist (BCPS). She also hopes to have a non-profit organization whose goal is to offer medication therapy management (MTM) for people who may not have direct and immediate access to a healthcare provider. Nneamaka is currently the vice president of Lambda Kappa Sigma fraternity, member of the American Pharmacists Association, just to name a few. She also volunteers once a month with the East Ford Bend Human Needs Ministry and is a peer tutor on Principles of Drug action.

Stanley Azubike is a pharmacy major and a junior at TSU. Born and raised in Anambra, Nigerian, he moved to U.S at the age of 12. He is currently a Resident Assistant at Linair East at TSU. He is also an Honor Roll student and a member of the National Society of Collegiate Scholars. Stanley has always strived for success and believes that failure is never an option. Overall, his ultimate goal is to gain experience and understanding that will empower him to continue chasing his dream as a pharmacologist, and help make an impact on people's lives.

Minh Do was born in Vietnam and lived in California and worked as a medical assistant before settling in Texas. She completed her undergraduate coursework at the TSU and Lone Star College. She is now a second year graduate student of the Doctor of Pharmacy program at TSU's College of Pharmacy and Health Sciences. She plans to pursue a residency program to become a clinical pharmacist to work in the government sector after graduation and to continue doing research. Helping her community is always her pleasure, and she tries to do it whenever she has a chance. She is also a member of the American Pharmacist Association. Eager to learn to get a wide knowledge of science and medicine in order to help her community after graduation, she is very interested in doing research especially in cardiology.

Sona Doshi is from Dallas, TX, and has earned her Bachelor of Science degree in nutritional sciences from the University of Texas at Austin. Sona is now a third year pharmacy student at TSU. For the past four years, Sona worked in a retail pharmacy during her breaks from school. After completing her Doctorate in pharmacy, her goal is to apply for a residency and specialize in oncology. She is a part of different organizations like Texas Pharmacy Association, and is the community co-chair of Student Societies of Health-System Pharmacy (SSHP). Sona has received scholarships based on her academic achievements and involvement in pharmacy related activities. In her free time, Sona likes to update her blog, travel and participate in community service activities.

Oluchi Juliet Emelogu is a second year pharmacy student at TSU. She completed her undergraduate pre-pharmacy requirements at the University of Houston. Upon graduation, she plans to apply for a residency in Ambulatory Care with a secondary focus in Academia. Her short term goal is to work as a Clinical Pharmacist and her long term goal is to return to TSU College of Pharmacy as an Associate Professor. In April 2013, she received the FASEB-MARC Travel Award which enabled her to attend the Experimental Biology conference in Boston, Massachusetts. Her experience there sparked an interest in conducting research that will impact the field of pharmacy. Oluchi is heavily involved in professional organizations, including Kappa Psi Pharmaceutical Fraternity, Inc. and African Pharmacy Students Association, in which she serves as the Academic Chair

Oluwaseyi Fasiku was born and raised in Lagos, Nigeria. She completed her pre-pharmacy coursework at Texas Southern University. She is now a second year graduate student of the Doctor of Pharmacy program at TSU's College of Pharmacy and Health Sciences. Her inclination towards pharmacy is fueled by her desire to gain knowledge about safe and effective drug use, and to help improve the health of people around her through a meaningful career. She hopes to pursue a residency program in pediatric pharmacy or a pharmacy industry fellowship and to continue doing research upon graduation. She serves as the patient counseling chair of the American Pharmacist Association –Academy of Student Pharmacists, TSU chapter. She is also the fundraising gala chair of the African Pharmacy Students Association, TSU chapter. She enjoys tutoring and volunteering her time in various food drives, organizations, and health fairs in the community.

Jessica Guastadisegni was born and raised in Palos Hills, Illinois and completed her undergraduate coursework at Union University in Jackson, Tennessee. She is now a fourth year graduate student of the Doctor of Pharmacy program at TSU's College of Pharmacy and Health Sciences. She hopes to complete an ambulatory care residency after graduation and continue doing research. Jessica Guastadisegni is part of several extracurricular activities including TSU's chapters of the Student Society of Health-System Pharmacy, the American Pharmacist Association, and the Student National Pharmaceutical Association as well as the Rho Chi Honor Society and Phi Lambda Sigma Leadership Society. When not working on her studies, she enjoys volunteering at health fairs, charity walks, toy/food drives, and other events that promote the health of her community.

Rachel Le is currently a P3 student in the TSU's College of Pharmacy and Health Sciences. She did her undergraduate studies at Houston Baptist University starting off as a pre-med student. After her dad suffered from a minor heart attack, she switched to the University of Houston pharmacy program and is currently at TSU. Her goal is to open up her own compounding pharmacy.

Esther Okoro was born and raised in Dallas, Texas and completed her undergraduate studies at Southwestern Oklahoma State University. She is now pursing her Doctorate in Pharmacy at TSU's College of Pharmacy and Health Sciences. As an upcoming third year professional student, she has been briefly introduced to many different fields in the pharmaceutical industry such as fellowship, ambulatory care, and clinical specializations. Apart from being a pharmacy student, she is involved in various organizations such Student National Pharmaceutical Association (SNPhA) and Kappa Psi Pharmaceutical Fraternity, Inc. where she serves as a Co-Chaplain. After receiving her doctorate, she plans on completing a residency or fellowship in pharmacology.

Uyen Uyen Tran is a P3 student in TSU's College of Pharmacy and Health Science. She was 25 years old when she arrived in the United States from Vietnam. With the help and encouragement of her family, she took English Second Languages (ESL) from the local Community College and passed the COMPASS Test. With this certification, she was able to take college level classes at Houston Community College and obtained an Associates Art Degree. Ever since she was a kid, she always wanted to work in the medical field and she enrolled in the University of Houston as a pre-pharmacy major and was later accepted into the College of Pharmacy at TSU. This is her second year in the summer research program.

Lilia Vera is currently a third year pharmacy student at TSU-COPHS, after recently earning a bachelors of science in biology from the University of Houston. She came from a family with Mexican origins that to this day are actively using herbal medicines and while completing her bachelor's degree in biology was able to answer several questions on how certain herbal medications work. After pharmacy school, she may attend graduate school or join an institution where research questions like mine are waiting to be answered.

Reina Vera is currently a second year pharmacy student. She has a bachelor's of science in Biology with a minor in chemistry from the University of Houston. Her long term goal is to attain a residency position after the completion of the pharmacy degree program.

Harris Yango was born and raised in Yaounde, Cameroon and completed two years of undergraduate studies at TSU. He is now a first year graduate student of the Doctor of Pharmacy program at TSU's College of Pharmacy and Health Sciences. He hopes to complete a post graduate residency and open up a Pharmacy of his own. He is part of several extracurricular activities including the African Pharmacy Student Association (APSA) in which he is an active member. He works for Kroger Pharmacy as Pharmacy Technician. When not overloaded with studies and work, he allocates time to give back to the community by volunteering his time to help the community as well enhance the university-community relationship.

Student Abstracts

Nneoma Agwu
Mentors: Ya Fatou Njie-Mbye and Sunny E. Ohia

Hydrogen Sulfide Regulates Prostaglandin Production in the Isolated Bovine Retina

Prostanoids can regulate basal endogenous levels of hydrogen sulfide (H_2S) in the neural retina. It remains to be determined whether this gas can modulate the biosynthesis of prostanoids such as prostaglandin E_2 in the retina. The goal of this study is to investigate whether H_2S can alter prostaglandin production in the mammalian neural retina. Bovine retinae were incubated in fresh oxygenated Krebs buffer solution for 30 minutes and subsequently exposed to different concentrations of H_2S-releasing agents (L-cysteine and sodium hydrosulfide; NaHS). After incubation, tissues were homogenized and both homogenates and media were collected and prepared for prostaglandin E_2 (PGE_2) Enzyme-Immunoassay (EIA) using a well-established methodology. Retinal tissues treated with NaHS exhibited a significant ($p<0.01$) increase in basal PGE_2 levels with the maximum effect achieved at 10 nM. Furthermore, NaHS (10 nM - 100 μM) caused a concentration-dependent increase in PGE_2 concentrations in the incubation media of treated tissues. In fact, NaHS (100 μM) caused a 1.5 fold increase in PGE_2 concentrations in the incubation media when compared to basal levels. L-cysteine (1 nM- 10 μM) also evoked a significant ($p < 0.05$) increase in PGE_2 production in tissues exposed to this H_2S substrate. However, there was no significant increase in PGE_2 production in the incubation media containing tissues that were treated with L-cysteine. H_2S (using L-cysteine and NaHS as donors) can increase the endogenous biosynthesis of PGE_2 in isolated bovine neural retina, indicating that prostanoids mediate the pharmacological actions of this gas in the eye.

Nneamaka Ajaero
Mentor: Amruthesh Shivachar

Dual Hydrolase and Phosphatase Enzyme Activities of Soluble Epoxide Hydrolase (sEH) in Glioblastoma Cells

Glioblastoma is the most common and aggressive brain tumor cells in humans. Due to its poor prognosis, patients have a survival of less than two years following diagnosis. The aggressiveness of the cancer cells has been attributed to their expression and production of various biomolecules, including enzymes and endogenous substrates that enhance cell growth. Among the endogenous molecules, arachidonic acid epoxygenase metabolites, mainly epoxyeicosatrienoic acids (EET), have been linked to cancer cell proliferation as well as angiogenesis. However, the action of EETs is under the direct control of soluble epoxide Hydrolase (sEH) which has dual enzyme activities: a C-terminal hydrolase and an N-terminal phosphatase. The former activity is responsible for metabolizing EET into their less active diols. The role of N-terminal phosphatase activity of sEH in cancer cells, glioblastoma in particular, remains unclear. The eventual goal of this study is to measure and quantify the dual activities of sEH protein. Quantitative enzyme assays of both the hydrolase and phosphatase activity. So far protein assays and cell culture techniques have been learned. We expect to find a lower hydrolase and phosphatase activities in the rapidly growing glioblastoma cells in culture with a concomitant increase in the endogenous EETs and phosphorylated key cellular proteins and/or kinases.

Minh Y Do
Mentor: Kasturi Ranganna
Role of Clusterin/Apolipoprotein J (CLU) in Histone Deacetylase Inhibitor (HDACi) Inhibited Vascular Smooth Muscle Cell (VSMC) Proliferation.

The excessive proliferation and migration of VSMC from arterial media to intima are the crucial contributors to the neointimal hyperplasia that is responsible for the pathogenesis of atherosclerosis and clinical pathologies including restenosis after angioplasty and vein-graft failure. Butyrate (BA), a histone deacetylase inhibitor (HDACi), exhibits potential anti-atherogenic effect by exhibiting antiproliferative, antioxidant, and anti-inflammatory effects on VSMC. Clusterin/apolipoprotein J (CLU) is one of the genes upregulated by butyrate; however, role of CLU in VSMC proliferation is controversial. Therefore, this study aims to confirm whether CLU upregulation by butyrate plays a role in VSMC proliferation arrest by silencing CLU gene expression. Small interfering RNA (siRNA)-mediated gene silencing was performed by transfecting proliferating rat aortic VSMC with four different CLU siRNAs prior to treatment with 5 mM butyrate. After 48 h of treatment with butyrate, the impact of CLU gene silencing on butyrate-induced CLU secretion/ expression, and inhibition of VSMC proliferation by butyrate were determined by western blot analysis of culture medium and cell lysates, and by using BIO-RAD cell counter. Western analysis revealed nearly 80% reduction in CLU expression in positive siRNA transfected VSMC compared to butyrate treated VSMC, indicating silencing of CLU gene expression by siRNAs. Moreover, butyrate inhibited VSMC proliferation was further inhibited by siRNA transfection. Silencing of CLU with positive siRNA appears to increase cell proliferation. These results indicate that silencing of CLU gene expression appears to reverse butyrate inhibited VSMC proliferation suggesting that CLU may play a role in butyrate-inhibited VSMC proliferation.

Sona Doshi
Mentor: Selvam Chelliah
Structure Based Virtual Screening for Identification of Novel Hit Molecules for Sphingosine kinase -1

Sphingosine kinase 1 (SphK1) is an oncogenic lipid kinase that regulates the sphingolipid metabolism and is more closely linked to signaling pathways associated with cancer cell proliferation, metastasis. The promitogenic sphingosine-1-phosphate (S1P) is generated by the action of SphK1. Overexpression of SphK1 is observed in many tumor tissues. Inhibition of SphK1 is considered a novel approach for the treatment of cancers including metastatic cancer. Therefore, current work focuses on the discovery of novel SphK1 inhibitors. The major objective of this study is to discover novel hit molecules from virtual high-throughput screening for SphK1. Analysis of co-crystallized complexes of SphK1 inhibitors revealed the important interactions between the protein and ligand. Based on the resolution of the X-ray crystal structure, a pdb (4L02) was chosen for docking studies. A drug-like subset from a Zinc database was selected for the present study. Omega2 was used to generate the conformers for each compound. FRED docked multiple conformers into the receptor active site. The exhaustive search method systematically allows the rotation and translations of each conformer and the top scoring poses are optimized and scored. The Chemgauss 4 scoring function was used to rank the hits. All the available crystal structures of human SphK1-inhibitor complexes were analyzed in detail to better understand the crucial binding site interactions. The virtual screening on the decoy set aided in setting up the optimized protocol for virtual screening of a large library containing 0.45 million lead-like compounds from the Zinc database. The top scored 500 hits in each subset were visually inspected to pick the right compounds for further analysis.

Oluchi Juliet Emelogu
Mentor: Uche Anadu Ndefo
Attitudes and Beliefs of African Immigrants in the US on Birth Control

The purpose of this study was to determine the attitudes and utilization of contraceptive methods with a focus on ethnic and gender differences in US immigrants of African descent. This was a descriptive study to understand contraceptive attitudes of African immigrants, while exploring demographics, US acculturation, and sexual behavior by incorporating the Contraceptive Attitude Scale (CAS). An online electronic survey was developed and administered to immigrant adults (male and female). Those that did not live in the United States were excluded. The contraceptive methods evaluated were the male condom, oral contraceptive pills, intrauterine device, birth control patch, vaginal ring, hormone injection, abstinence, withdrawal method and emergency contraception. Factors considered included age, time since immigration, education level, marital status, religion, whether participants were of African descent and whether they were first, second or third generation American. Most African immigrants had a positive attitude regarding contraception. The first generation (foreign-born) Americans had the lowest contraceptive attitude scores, while the third generation Americans (US born with US born parents) had the highest scores. The participants 44 and older had the lowest contraceptive scores, while participants 34 to 44 years old had the highest scores. The most popular contraceptive method was the male condom while the least popular method was the hormone injection. With the findings from this study, health care professionals can develop more efficient strategies to educate the African immigrant population on effective and safe contraceptive methods. The data will be useful to provide adequate family planning programs on contraceptive use geared specifically towards African immigrants and to provide more efficient counseling for African immigrant patients as well.

Harris Yango
Mentor: Sondip Mathur
Will The Affordable Care Act Mean The End Of Free Healthcare Clinics: Applying an Economic Model

The primary goal of the Affordable Care Act (ACA) is to expand Medicaid eligibility to adults with income levels up to 138% of the federal poverty level (FPL). ACA is estimated to expand coverage to 32 million out of the 50 million uninsured. Theoretically, this raises a concern about the fate of free clinics after implementation of ACA. Free Clinics are health facilities that provide medical care to the uninsured, underinsured and low income individuals. The primary objective of the study is to examine the impact of ACA on free healthcare clinics framed by economic principles related to the behavior of individual demand and supply of health insurance. Information pertaining to the ACA exchange market plans, Medicaid expansion and eligibility criteria was obtained through Government and Foundation websites, Texas Medical Center Library resources, and interview of staff at a free/charity clinic in Houston. Study results summarize and compare ACA/Medicaid eligibility criteria and coverage costs with that at a charity clinic. Potential coverage gaps and behavior of the various participants in the health insurance market suggests that closure of free clinics is a mistaken belief. Given that free clinics have much simpler and expansive eligibility criteria, certain individual profiles will continue to be served by charity clinics. Likewise, the economics of Insurance plan premiums and cost-sharing compared to that of a charity clinic's sliding-scale fee structure, in many cases, tilts the balance towards a decision not to buy coverage. Finally, states like Texas, which have opted not to expand Medicaid makes the case for having charity clinics remain compelling.

Oluwaseyi Fasiku
Mentors: Ya Fatou Njie-Mbye and Sunny E. Ohia

Neuroprotective Effects of Hydrogen Sulfide and Endocannabinoids On Glutamate-Induced Excitotoxicity in Neural Retinae

Excessive glutamate has been implicated in neurodegenerative diseases. The need to protect the retina against excitotoxicity caused by glutamate is an important strategy for the therapy of ocular diseases. Hydrogen sulfide (H_2S) and endocannabinoids have been reported to exert protective action against retinal damage in models of neurodegenerative diseases. The purpose of this study was to investigate the neuroprotective effects of H_2S and endocannabinoids on isolated bovine neural retina exposed to glutamate excitotoxicity. Bovine retinal tissues were pretreated with H_2S administered as L-cysteine (10 nM), and endocannabinoids (AEA 1 nM and 2-AG 3 μM) prior to glutamate (2 mM) exposure. The neuroprotective effects of H_2S and endocannabinoids were determined using the methylthiazolydiphenyl-tetrazolium bromide (MTT) assay. For receptor antagonist studies, CB1- and CB2-antagonists [AM251 (1 μM), SR144528 (1 μM)] and the Transient Receptor Potential Vanilloid 1 (TRPV1) inhibitor, SB366791 (10 μM) were administered 30 minutes prior to the addition of agonists (AEA, 2-AG). **Results:** In the presence of glutamate (2 mM), only 54% of tissues were viable as measured by the MTT assay. Pretreatment with L-cysteine (10 nM) protected the retina and increased tissue viability from 54% to 96%. Similarly, AEA and 2-AG significantly ($p < 0.05$) protected neural retina against glutamate damage. The neuroprotective effects of AEA were completely blocked by TRPV1 inhibition, but not by the CB1- and CB2-antagonists, AM251 (1 μM) and SR144528 (1 μM). H_2S and endocannabinoids can protect bovine retinal tissues from glutamate-induced excitotoxic damage. Furthermore, the neuroprotective effect of AEA is mediated by the vanilloid receptor but not by the cannabinoid receptors.

Rachel Le
Mentor: Dong Liang

Stability of Azithromycin Suspension Using HLPC UV Reverse Phase Methodology

Azithromycin is a macrolide antibiotic commonly used in children and adults. Favorable formulations of azithromycin are suspensions, solutions, and syrups due to dosing flexibility and the infant's inability to swallow whole tablets. However, stability of these available formulations over extended periods of time is unknown. An HPLC method was developed to determine drug stability by incorporating azithromycin into four different suspending agents: sucrose simple syrup, sodium carboxymethylcellulose, Ora-Sweet, and Ora-Plus. A sensitive and rapid assay was developed to determine levels of Azithromycin in preparations using the Waters 600 HPLC UV machine with a reverse phase, isocratic method. Optimal results were obtained at 200 nm, 40°C, and a flow rate of 1.5 mL/min. Composition of the mobile phase was 50:50 acetonitrile and phosphate buffer at a pH of 7.5. A standard curve ranging from 50-1000 ug/mL displayed coefficient values > 0.997. The drug displayed a retention time of 1.1 minutes. A sensitive and rapid assay for HPLC UV was established with a linearity of 99.74%.

Esther C. Okoro
Mentors: Ya Fatou Njie-Mbye and Sunny E. Ohia
Sodium Hydrosulfide- Induced Increase in Aqueous Humor Outflow: Role of Hydrogen Sulfide and Prostanoids

The hydrogen sulfide (H_2S) donor, sodium hydrosulfide (NaHS), can reduce intraocular pressure (IOP) presumably via an action on aqueous humor outflow through the trabecular meshwork (TM). However, the mechanism of action of NaHS on aqueous humor outflow is unknown. The goal of this study is to investigate the mechanism of action of NaHS-induced increase in aqueous humor outflow facility in porcine trabecular meshwork tissues. Porcine anterior segment explants were mounted onto an organ culture model and perfused with Dulbecco's Modified Eagles Medium (DMEM) using a constant perfusion head of 7.35 mmHg and maintained at 37 °C with 95% air and 5% CO_2. Once aqueous humor outflow was stable (~3hrs), the explants were exposed to the cyclooxygenase (COX) inhibitor, flurbiprofen (FBF, 3 μM) and the inhibitors of H_2S biosynthesis [aminooxyacetic acid (AOA, 30 μM); propargylglycine (PAG, 1 mM)], 30 minutes prior to treatment with NaHS (10 μM). We found that FBF (3 μM) completely blocked the NaHS induced increase in aqueous humor outflow. In the presence of AOA (30 μM), the increase in aqueous humor outflow caused by NaHS was significantly ($P < 0.05$) inhibited from [154.8 ± 3.54% of basal] to [118.2 ± 3.85% of basal]. We conclude that the ability of NaHS to increase aqueous humor outflow in porcine trabecular meshwork is dependent, at least in part, upon the intramural generation of H_2S and on the biosynthesis of prostanoids.

Uyen Uyen Tran
Mentor: Tyrone Felder
Formulation and Characterization of Resveratrol Nanoparticles using Polylactic Co Glycolic Acid (PLGA) for Developing control Release Administration

Resveratrol is a natural compound which is rich in a variety of fruits such as blueberries and skin of red grades and peanuts. It have been shown to have antioxidant and anti-inflammatory effects. However, resveratrol has limited bioactivity due to rapid isomerization and biotransformation. Therefore, a novel formulation that can improve bioactivity potency and control duration of resveratrol release is very important for effective intravenous administration. Three formulations of resveratrol were made to form nanoparticles. The first formulation was 16.8 mg of resveratrol and 50 mg of 50/50 PLGA polymer. Acetone was used as the solvent to dissolve the 50/50 PLGA and resveratrol. The second and third formulation were made with the same amount of resveratrol and PLGA by using either 65/35 PLGA or 75/25 PLGA. The 65/35 PLGA was mixed with resveratrol for the second batch and 75/25 PLGA polymer was used for the third batch. Each formulation was injected into 2% P188 surfactant solution while it was stirred on a magnetic plate. Nanoparticles were formed after 24 hours of evaporation. Lyophilization and dry vacuum methods was then applied to stabilize and collect nanoparticles**.** The lyophilization method was used for the first formulation and the dry vacuum method was performed for the second and third formulation. The powder of nanoparticles from each formulation were characterized for particle size by using Zetasizer naNo series ZS and encapsulation efficiency by performing HPLC assay. The total weigh from each formulation was measured. The first formulation consisted of 535 mg nanoparticles. The second and third formulation was measured as 440 mg and 598 mg nanoparticles, respectively. Particle size from the three batches was ranged from 200-300 nm. The 50/50 PLGA formulation had the smallest particle size and the most homogenous particles. The 33.16 % encapsulation efficiency of resveratrol in 50/50 PLGA formulation was the highest percentage compared to the other two PLGA formulations. Encapsulation efficiency of 65/35 PLGA and 75/25 PLGA was 10.8 % and 16.12 %, subsequently. Overall, bioactive trans resveratrol nanoparticles were successfully encapsulated and formed. The first formulation which involved resveratrol and 50/50 PLGA was selected for further testing in vitro.

Lilia Vera,
Mentors: Dong Liang and Edward Bell
Formulating an Optimal Oral Dissolving Film by Varying HPMC and Maltodextrin Concentrations

Oral dissolving films have attracted recent attention as an alternative route for the administration of medications beset with complications such as low oral bioavailability and poor compliance in certain populations. This study was conducted to produce an optimized oral dissolving film that might be useful for the incorporation of drugs with low oral bioavailability. Film excipients included commonly used polymers, hydroxypropyl methylcellulose (HPMC) and maltodextrin, along with glycerin and water. Films were prepared by mixing excipients in various ratios until reaching complete polymer deliquescence, followed by the drying of films at room temperature. Films were analyzed for morphology, surface pH, and disintegration time utilizing a USP Dissolution Apparatus 2 device. Films prepared with smaller concentrations of HPMC and maltodextrin combination, ranging from 2% w/v to 7% w/v, demonstrated shorter drying times compared to films consisting of ranges from 45% w/v to 55% w/v. Film disintegration time noticeably increased in films with maltodextrin concentrations of 3.5 % w/v- 5% w/v. In addition, films containing HPMC displayed undesirable bubble formation. Therefore, optimal results were reached with minimal formation of bubbles, faster disintegration time, and a closer to neutral surface pH. After evaluating films containing various polymer ratios, a film formulation featuring the polymer combination of 2% w/v maltodextrin and 2% w/v HPMC displayed the best morphology and dissolution characteristics. Further investigation is required to determine the suitability of this film and analogous films for the inclusion and release of low oral bioavailability drugs.

Reina Vera
Mentor: Flora G. Estes
Polycystic Kidney Disease: What is it and What is the Overall Level of Awareness?

In the United States, about 60,000 people have Polycystic Kidney Disease (PKD**).** The two major inherited forms are Autosomal Dominant (AD) and Autosomal Recessive (AR) with ADPKD being the most common. The cause is related to gene mutations on chromosomes 4, 6, and 16 leading to cyst formation in the kidney. The development and progressive enlargement of cysts in the kidneys and other organs, eventually lead to end-stage renal disease (ESRD). The intent of this study was to determine the level of awareness of PKD among residents in the greater Houston area. A 19 question survey was administered to 324 consenting participants 18 years and older. The survey was analyzed using a descriptive analysis. The data indicated that 68.8% of participants had never heard of PKD; 31.2% had heard about the disease and 2.78% knew someone with PKD. The survey further indicated those that had never heard of PKD were greatest among blue collar/skilled labor 26.5% and professionals 22%. Awareness of PKD affecting the kidneys, which could have been bias considering the name of the disease, was 37%; requiring kidney transplant 20%, hereditary 20%, and requiring dialysis 19%. This survey indicated that the population was not aware of PKD. Those who had heard did not have a thorough understanding of the disease. Cystic disease is the 4th leading cause of kidney failure. Currently there is no treatment or cure for PKD. The study does support the need to increase awareness of polycystic kidney disease.

Jessica Guastadisegni
Mentor: Joshua Swan

A Single-Center Retrospective Cohort Study of Pharmacy Residency Research Projects to Test the Association Between Study Design and Publication

Thousands of major residency research projects are conducted at American Society of Health-System Pharmacists accredited residencies each year; however, only a small proportion of these studies (about 15%) are published in peer-reviewed journals. A previous study reported that while only a small proportion of these projects are prospective study designs (about 6%), these prospective studies were published more frequently than retrospective studies. Therefore, it was hypothesized that prospective studies will be published more frequently than retrospective studies in pharmacy residency research projects conducted at Houston Methodist Hospital. This study aimed to compare proportions of projects that were published in a peer-reviewed medical journal between studies that were prospective (including mixed designs that were both retrospective and prospective) versus studies that were retrospective. This single-center retrospective cohort study included all pharmacy residency research projects completed at Houston Methodist Hospital from 2001 to 2012. A data collection tool for extracting study design characteristics was developed and will be piloted by four investigators. Two independent investigators, who are unaware of publication status, will extract study design variables from internal manuscript reports of all projects. Inter-rater reliability between investigators will be compared with the kappa statistic. The proportion of projects published between study designs will be compared using the chi-squared test. Seventy-four pharmacy residency research projects were completed at Houston Methodist Hospital from 2001 to 2012. Of these, 22% (16 of 74) were published in peer-reviewed medical journals. Abstract reports were obtained for 97% (72 of 74) of projects; however, internal manuscript reports were only obtained for 66% (49 of 74) of studies, the rest could not be located. The determination of which study design is most associated with publication is still in progress.

Stanley Azubike
Mentor: Ashraf Mozayani

AB-FUBINACA: Inoculation, Segmentation and Preliminary Study using GC-MS and LC-TOF-MS

AB–FUBINACA (N-(1-amino-3-methyl-1-oxobutan-2-yl)-1-(4-fluorobenzyl)-1H-indazole-3-carboxamide) is a synthetic cannabinoid that has pharmacological effects similar to the schedule I hallucinogen delta-9- tetrahydrocannabinol (THC). The aim of this study is to obtain preliminary information about metabolism and detection of AB-FUBINACA in several biological specimens of rats. This is the first metabolism study that is done for AB-FUBINACA in animals. For the metabolism study a LC-TOF-MS instrument was used to find possible metabolites of AB-FUBINACA. AB-FUBINACA in DMSO/Saline solution (2:8) was administered intraperitoneally at 1 mg/kg to 8 rats daily for 5 days. Urine samples were collected every day at same time and stored -20 C until analysis. GC-MS analysis was carried out using a GC-MS QP2010 Ultra instrument, with an auto sampler AOC-20 s, and an auto injector AOC-20i. AB-FUBINACA was not detected as a result of low concentration in GC-MS. However, by LC-TOF-MS, one metabolite was determined as a hydroxyl metabolite of AB-FUBINACA. Studies are in progress to improve the detection of these metabolites.

2014 COST UNDERGRADUATE STUDENTS AND FACULTY MENTORS

Student	Department	Mentor
Benjamin Caballero	Biology	Hector Miranda
FranChell Davidson	Mathematics	Willie Taylor
Brittani Davis	Biology	Audrey Player
Amanita Dicko	Engineering Technology	Yaqi Wanyan
Ugochukwu Ezenekwe	Physics	Mark Harvey
Chibueze Ezeudu	Chemistry	Jahmario Williams
Marquesha Foreman	Mathematics	Roderick Holmes
Micah Harper	Aviation Science	Vernon Baker
Amada Jackson	Biology	Hector Miranda
Charese Jeffries	Chemistry	Hyun-Min Hwang
Franklin Kigwe	Engineering Technology	Yunjiao Wang
Ray Mbonu	Chemistry	Ayodotun Sodipe
Ray Motte	Transportation Studies	Fengxiang Qiao
Miles Sewell-Cortez	Chemistry	CJ Tymczak
Samuel Teferra	Computer Science	Mohsen Javadian
Fernando Valdez	Engineering Technology	Graham Thomas
Terrence Vaughn	Computer Science	Lila Ghemri
Eric Wilson	Physics	Daniel Vrinceanu
Tedrick Wilson	Biology	Erica Cassimere

Student Biographies

Benjamin Caballero was born in Los Angeles, California, but was raised in Houston, Texas. Benjamin has just finished his freshman year at TSU and is majoring in Biology, with a minor in Chemistry. Benjamin is a pre-medical student in the Early Medical School Acceptance Program (EMSAP), a joint program with the University of Texas Medical Branch (UTMB) in Galveston. Benjamin recently participated in Health Occupations Students of America (HOSA), in which he competed in the CPR/First Aid event on the national conference level in Orlando, Florida. This allowed him to interact and build a network of peers with similar goals and aspirations that will channel him further into the medical field. Upon completion of his bachelor's degree, Benjamin plans to attend the UTMB School of Medicine and become a physician.

FranChell Davidson was born and raised in Houston and she is currently a junior majoring in Mathematics and minoring in Computer Science at TSU. Currently, she is a member of The TSU Chapter of The National Society of Collegiate Scholars and recipient of The Louis Stokes Alliance for Minority Participation Scholarship. Last summer she participated in the College of Science and Technology Summer Undergraduate Research Program and learned Continuous Calculus vs. Discrete Calculus under supervision of Dr. Willie E. Taylor. Outside of her professional interests she is very family orientated, takes pleasure in reading books, enjoys being outside, and helping No More Victims Incorporated. In the future, she plans to obtain a Ph.D. degree in Mathematics and become a Mathematician.

Brittani Davis is a senior Biology major and Chemistry minor at TSU. Originally from Indianapolis, Indiana, Brittani came to TSU as part of the Thomas F. Freeman Honors College. Her every day experiences made her discover her passion and deep interest in the health sciences specifically physical therapy. She is a member of the National Society of Collegiate Scholars, has served in the general body and executive board of the Collegiate Black Women of TSU, and has been working at the Recreation Center on the campus.

Aminata Dicko is a junior working to earn a Bachelor of Science in Civil Engineering Technology at TSU. She is also the newly appointed Secretary of TSU's National Society of Black Engineers (NSBE) chapter. Her ultimate goal is to pursue a Master's degree in Civil Engineering and have a successful career in the construction or geotechnical industries.

Chibueze Simon Ezeudu was born and raised in Enugu State, Nigeria. He came to TSU straight out of high school in Nigeria and is currently on a pre-medical track studying Chemistry as an undergraduate degree. He has been in the Thomas F. Freeman Honors College, a TSU Debate Team member, a Presidential Leadership Scholar and has been on the Student Government Association of TSU serving as the Senator of International Students Organization. For the past three years, Chibueze has worked for Student's Enhancement Services as a tutor, assisting students in Mathematics, Chemistry, Biology and Physics Classes.

Micah Harper graduated from Alief Taylor High School in 2011 and entered TSU in the fall of 2011, majoring in Aviation Science. He received a full scholarship from TSU as an honor student in the Thomas F Freemans Honors College. He chose aviation because public transportation intrigues him and aviation today brings the world many benefits. Currently, Micah is in his senior year and upon graduation, he is pursuing a career as a Naval Aviator in the United States Navy.

Marquesha Foreman is a native of Jennings, Louisiana and graduated from Jennings High School in 2011. Since fall 2011, Marquesha has attended TSU on a full academic scholarship and is pursuing a degree in Mathematics coupling with a minor in Computer Science. She served as Sergeant at Arms of the University Academic Village and engaged in the TSU Hip Hop Society her freshman year. During her sophomore year, she served as Vice President of the TSU chapter of the National Society of Collegiate Scholars and is currently the President. During her junior year, she served as a supplemental math instructor in the College of Science and Technology. She has volunteered for various organizations such as the annual Avon Breast Cancer Walk and Agape Ministries Development Center. Upon graduation, she wishes to pursue a doctorate degree in Mathematics.

Amanda Jackson is native to Kansas City, Missouri, and a senior candidate for a bachelor's in Biology and a minor in Chemistry at TSU. As an intern of the Houston Zoo's Herpetology Department, she cared (fed, watered, provided medications, and maintained the environment) for many snakes, lizards, turtles, frogs and toads. As a freshman and sophomore, she was the first chair cellist for the TSU Chamber Orchestra and has been a member of the TSU women's track team for 3 years. This year she became a member of the Student Athletic Advisory Council (SAAC).

C**harese Jeffries** is sophomore Chemistry major at TSU. She was born and raised in St. Louis, Missouri. She came to TSU with a Louis Strokes Alliance for Minority Participation Scholarship. Ms. Jeffries became a part of The National Society of Collegiate Scholars in her freshman year. She spends time doing community service work and helping out those who are in need. She also loves tutoring those who may need help in some subject areas. After the completion of her bachelor's degree, she plans to obtain a master's degree in Chemistry and to continue to do research that helps cure diseases.

Franklin Kigwe was born and raised in Nairobi, Kenya and received a bachelor degree in International Business Administration from the United States International University in Nairobi, Kenya. He is now a post bachelor student of the Civil Engineering Program at TSU. Franklin was a delegate and ambassador with The Model United Nation East Africa program. In addition, he volunteers at children's orphanages. His career goals are to create sustainable yet inexpensive schools and hospitals.

Ray Mbonu is a Houston native and is currently a senior with a major in Chemistry and a minor in Mathematics. He is in both the Honors' College and Louis Stokes Alliances for Minority Participation (LSAMP) programs. Ray is a part of several extracurricular activities including the African Students Association, Chemistry Club, and a College of Science and Technology Student Ambassador. He attends St. Albert's of Trapani Catholic Church where he is a member of Youth Choir, Ushers, and Lector's Ministries. His hobbies include reading, writing, drawing, and travelling. After graduating from TSU, he plans on going to graduate school to further his education, research, and, obtain a master's in Chemical Engineering.

Miles Sewell-Cortez was home-schooled through secondary education and attended Tarrant County College in North Texas for two years. Now a junior at TSU, he is completing his Bachelor's degree in Chemistry and is in the H-LSAMP program. He was awarded a 2014-2015 Undergraduate Research Enrichment Scholarship through COST and has participated in research with TSU's NSF-CREST Center on Computational Chemistry. He continues to develop his interests by participating in the TSU Confucius Institute, where he is learning Mandarin, and by forging a research partnership with his brother and fellow research scholar Christian Sewell-Cortez. His goal after graduation is to obtain a dual M.D. / Ph.D. degree.

Ray Motte graduated from Ball High School in 2012 and is currently a sophomore majoring in Maritime Transportation at TSU. He is currently on the honor roll at TSU. His main interests outside of his studies are voice-over, broadcasting, radio-television and Hip-Hop music. Ray also does volunteer work with the Maritime Industry and last fall, as part of this group, he delivered food to the poor. After graduation, Ray plans to be a Management Security Officer at the Port of Houston.

Samuel Teferra moved from Springfield in Northern Virginia to Houston and is currently a junior at TSU majoring in Computer Science. While not writing or debugging some crazy computer program codes, he volunteers at organizations, specifically organizations that help people readjust after legally immigrating here. After graduation, he aspires to complete his master's degree.

Ugochukwu Ezenekwe was born and raised in Nigeria, where he studied physics along with Electronics Technology at the University of Jos, Nigeria. At TSU he is also a Physics major and an undergraduate student assistant. He will commence studies in the Health Physics program at TSU in the fall 2014 semester. He is a member of the National Society of Collegiate Scholars and also has been on the Dean's and President's List. After completing his studies in the Health Physics at TSU, he plans to pursue a Ph.D. degree in Medical Physics .

Fernando Valdez is a first semester senior at TSU studying Electronics Engineering Technology. He was born in Mexico and moved to the United States at the age of 8. Fernando graduated from Sharpstown High school in May 2010 and attended TSU the following semester, being the first in his family to attend college. Fernando's area of interest is Robotics Engineering, but is currently pursuing his bachelors of science in the area of technology, working to be an Electrical Engineer. Fernando has a passion for mathematics, science and technology. He worked as a lab assistant in the Engineer Department where he helped students understand concepts of AC/DC circuits. He is also heavily involved with his fraternity, Sigma Lambda Beta Int'l Fraternity, and enjoys helping high school seniors apply for college.

Terence Vaughn is originally from Seattle Washington and moved to Houston in 2002 where he began working as a full time musician. He toured with a variety of well-known recording artists as their personal pianist. Before coming to TSU, Terence started his college career at Houston Community College. He transferred to TSU to study Computer Science. Last summer Terence accepted an internship at Rutgers University. He assisted in the development and implementation of a software package for the Department of Homeland Security. Terence's main interests are software engineering and network penetration testing. Other interests include quantum computing, music, traveling, and spending time with family and friends. Upon graduation, Terence will attend graduate school in which he plans to pursue a Master's in Computer Science.

Eric Wilson was born in California, but raised in the mid-west, due to a number of moves due to his father's military career and moved to Houston in 1976. Before coming to TSU, Eric was in the U.S. Navy as a Sonar Technician for sixteen years, and also worked as an electronics technician in the oil and gas industry. He is currently a Physics major and is interested in starting a chapter of the Society of Physics Students here at TSU. His interests are computers, reading, art, science, world affairs, weather, cosmology, chess, and martial arts.

Tedrick Wilson attended Michael E. DeBakey High School for Health Professions, and is now a sophomore Biology major at TSU. Tedrick is employed as a student athletic trainer for various sports teams at TSU. The trainers' program deals with many aspects of injury prevention, treatment, and rehabilitation and his ultimate goal is to become a physician for a major sports team.

Student Abstracts

Benjamin Caballero
Mentor: Hector Miranda
Sequencing Complete Mitochondrial Genome of the Malayan Peacock-Pheasant *Polyplectron Malacense* and Estimating Genetic Distances with *P. Bicalcaratum* and *P. Napoleonis*

The evolutionary origin of the *Polyplectron* in Asia has been controversial. Some studies support the 'westward' colonization trajectory to main and Asia, while others suggest the opposite direction. To test these hypotheses, we are conducting a large-scale program of sequencing the whole mitochondrial genomes of about six species of *Polyplectron*, one of which is the Malayan Peacock –Pheasant (*Polyplectron malacense*). We designed primers using Primer3Plus, augmented by Geneious Pro and ClustalW programs. Both forward and reverse PCR reactions were sequenced and assembled. We have determined that the complete mitochondrial genome of *Polyplectron malacense* is 16,694 bp and contains 13 protein-coding genes, 2 rRNA genes, 22 tRNA genes and one control-region. We measured the genetic distances of P. malacense with two other Polyplectron whose mitogenomes have been recently been published. We observed 93.3% resemblance of sequences between *P. malacense* and *P. napoleonis*, and 94.2 % between *P. malacense* and *P. bicalcaratum*. The values provide suggestion that *P. malacense* is more closely related to P. napoleonis relative than to the mainland Asian *P. bicalcaratum.* The control region was determined to be 1165 bp, five bp shorter than that reported for *P. bicalcaratum,* and 15 bp shorter than *P. napoleonis.*

FranChell Davidson
Mentor: Willie E. Taylor
On the Solutions of Difference Equations

In this study the solutions of a difference equation ($x_{n+1} = \frac{f(x_n)}{x_{n-1}}$) was examined for various functions (f). While this equation has been studied by many people, no one has considered it for specific functions. This study will fill that void and focus on the qualitative behavior of solutions of boundedness, periodicity, and oscillation of solutions.

Brittani Davis
Mentor: Audrey Player
Identifying Gene Expression in Aggressive vs. Less Aggressive Breast Cancer

This study was to identify biomarkers related to TN cancers and validate their reliability. A total of six genes were put through a screening process to determine candidacy for further study. IL32 was 1 of several genes identified. It was examined to determine if it would be a potential biomarker for TN cancers. The thousands of genes were first grouped and then analyzed using T test to compare the two groups of genes (aggressive and less aggressive). From this, six genes were screened and examined using MDA MB231 RNA to represent TN and MCF7 cell line RNA to represent less aggressive breast cancer types. RNA levels were analyzed by performing Polymerase Chain Reaction (PCR). The six genes were screened and compared. The PCR and gel results showed that the IL32 gene showed the biggest difference in expression in the 231 versus the MCF7. It is concluded that IL32 is a potential candidate to identify and understand aggressive breast cancer.

Marquesha Foreman
Mentor: Roderick Homes

On the Solutions of $x_{n+1} = \frac{f(x_n)}{x_{n-1}}$ Where f is Piecewise Linear

Our goal in this study is to examine the long-term behavior of solutions of the following difference equation: $x_{n+1} = \frac{f(x_n)}{x_{n-1}}$, where *f* is piecewise linear, and the initial values x_{-1} and x_0 are non-zero real numbers. We examine the boundedness, periodicity, and the existence of oscillatory solutions.

Amanda Jackson
Mentor: Hector Miranda
Mitochondrial Genome Sequencing for Taxonomic Revision of Philippine Hawk-Owl (*Ninox Phillippensis*)

The Philippine Hawk-Owl *Ninox phillippensis* is an avian endemic to different islands of the Philippine archipelago. More recently, the species was split into seven allopatric species based on morphology and vocalization. At present, no genetic studies have been conducted in this group of birds. To test part of the taxonomic classification in delineation of these species, we sequenced the whole mitochondrial genome of two of the seven allopatric species; the Luzon Hawk-Owl *Ninox philippensis* found in Luzon, Samar and Leyte islands, and the Mindanao Hawk-Owl *Ninox spilocephalus* found on Mindanao Island. We sequenced the complete mitochondrial genome of *N. philippines* which comprises 16,227 bp (not annotated), while *N. spilocephalus* is about 80% sequenced. We aligned both sequences with another Ninox sequence and calculated the DNA sequence similarity based on three models of molecular evolution: the Jukes and Cantor model, the HKY model, and Hasegawa model. Overall sequence divergence based on aligned 4,370 bp among *N. philippensis*, *N. spilocephalus*, and the reference taxa *N. novaeseelandiae* from New Zealand showed that the genetic similarity between the allopatric species was 97.5% and that both were genetically similar to the New Zealand reference sequence. Based on the molecular clock calibration of 2 percent every 1 million years for mitochondrial genes, we surmise that the two allopatric species were separated by at least 1 million years.

Ray Motte
Mentor: Fengxiang Qiao
Development of a Smartphone Application for Traffic Signals

The goal of this study is to develop and test a smartphone application for drivers to improve driving performance. The application allows the driver to determine how many seconds it will take for specific traffic lights to change colors. The application was tested using a driving simulator. The application should be useful, especially during conditions of severe weather.

Charese Jeffries
Mentor: Hyun-Min Hwang
Triclosan in White Oak Bayou

Antimicrobial agents such as triclosan (TCS) and triclocarban (TCC) have been added to many personal care products, especially liquid hand soaps and detergents. Due to tremendous amount of consumption and less efficient removal in wastewater treatment plants, TCS and TCC have been detected at high levels in urban water ways receiving treated wastewater. This study investigated occurrence of TCS in the surface water of White Oak Bayou in Houston, TX. Water samples collected from 7 sites along the bayou covering entire White Oak Bayou. These samples were extracted using C_{18} solid phase extraction (SPE) cartridges for the measurement of TCS. Identification and quantification of TCS was performed using gas chromatograph-mass spectrometer (GC/MS). Concentrations of TCS varied from 247 to 398 ng/L. Because TCS is a manmade chemical, its presence indicates that entire White Oak Bayou is contaminated by TCS. Higher concentrations were detected at sites below effluent outfalls of treated wastewater. This study suggests that effluents from wastewater treatment plants are a major source of TCS in urban water columns. To reduce urban water contamination by emerging contaminants like TCS, wastewater treatment processes need to be enhanced.

Franklin W. Kigwe
Mentor: Yunjiao Wang
Relations Between Dynamics of Boolean network and Networks Of Ordinary Differential Equations (ODEs)

Due to progress in technology, gene regulatory networks have attracted a lot of recent attention. Understanding of the dynamics of gene regulatory networks sheds new insights into our life and leads to novel treatments for a wide range of diseases. Mathematical modeling has shown its indispensable role in unveiling network dynamics. Both networks of ordinary differential equations (ODEs) and Boolean networks are common models for gene regulatory networks. Both types of networks can capture the same set of dynamics. This naturally raises the question: what are the relationships between dynamics of coupled differential equations and Boolean networks? Most existing results are on the relations between the stable fixed points of Boolean network and equilibria of coupled differential equations. In this study, we exam dynamics including oscillating behavior of the two types of network systems. We compare the conditions that are necessary to have oscillating behavior and identify the similarities and differences between Boolean and ordinary differential equation systems. We can show this by comparing the dynamics of two-node and three-node systems. In addition, the knowledge gained from the dynamics of Boolean system provides guidance for developing associated coupled ODE models. In addition, networks of ODE can admit more detailed dynamics which cannot be captured by Boolean systems.

Ray Mbonu
Mentor: Ayodotun Sodipe
Cloning and Sequencing of a Plant GAPDH Gene

The objective of this project is to clone a portion of GAPDH gene from plants, insert this gene fragment into a plasmid vector, and analyze the sequences of resulting clones using bioinformatics tools. Glyceraldehyde 3-phosphate dehydrogenase (GAPDH) is an enzyme found in the genome of both plants and animals that is responsible for catalyzing glycolysis. It helps in the breakdown of glucose for carbon molecules and energy. It has been linked to apoptosis as well as diseases like Alzheimer's and Parkinson's disease. Once the 2 plant species were selected, the GAPDH gene was isolated from their DNA and cloned. A section of the GAPDH gene was amplified via PCR, assessed, amplified, and ligated into a plasmid vector. Afterwards, the DNA was transformed before being isolated ad analyzed by restriction digestion. The resulting DNA is sequenced and compared to the National Center for Biotechnology Information's (NCBI) GeneBank database for validity and possible similarities. Scientists believe the study on the GAPDH gene may lead to connections between its molecular aspects and its biomedical and evolutionary significance as well as possible breakthroughs in the therapeutic treatments of diseases.

Samuel Teferra
Mentor: Mohsen Javadian
Comparing Android and Apple for Applications Development

This research focused on the premise of obtaining the best platform for the development of an efficient and easy to use. The eclipse (for android) and x codec (for apple) are popular software that has been used to design applications in the apple store (apple) and google play (for android). After a few weeks of trials, eclipse (kepler version) for google proved to be an effective software to utilize. Eclipse is very versatile and rich in codes and fairly easy to manipulate. The research led us to discover many different ideas for an application. The application that was desired would be able to calculate tips for patrons in a restaurant or any other similar venues. This application demanded a lot of coding starting from the user interface all through the main activity java file. The objective was to create app that had to appear to be user friendly, while still being able to perform its intended function. Adding more functions and classes everyday to the program, and debugging many lines of codes proved to be very challenging since the application would all of a sudden crash; this was very time consuming. Finally, the beta version application had many functional buttons.

Fernando Valdez
Mentor: Graham Thomas
Making More Efficient Phtotovoltaic Cells Using Materials Absorbing Different Colors of Light

The photovoltaic industry is experiencing rapid growth as people around the world turn to alternative energy. Photovoltaic energy is the science of converting light energy into electrical energy and is achieved through the use of semiconductors. In this research, a method was developed and tested to increase the efficiency of solar cells using various materials that absorb different colors of light. Strips of different absorbent light materials were placed side by side on different solar cells to investigate the possibility of making the cells more efficient. Since different color materials attract light differently, it was hypothesized that if the colors were place next to Silicon (used in solar cells) then the efficiency would increase because each color attracts different amount of energy given by the rays of sun. However the actual data obtained revealed that the solar cell efficiency decreased or remained the same with the materials and methods used. The possible reason of the given efficiency is discussed along with the possible changes that can be made that could increase the outcome, a more efficient solar cell that would produce more power.

Terrence Vaughn
Mentor: Lila Ghemri
A User Centered Approach to Manage Identities in Online Social Networks

Since the introduction of Facebook, the popularity of social networking sites has grown exponentially over the years, encompassing millions of users. As social networks continue to grow and become more popular, users different social circles (friends, family, colleagues) may collide, as they all coexist under the same infrastructure. Considering the different levels of relationships between a user and their social circles, concerns about privacy arise. How does a user conceal private data? Who has access to it? And what is the most effective way in managing that? This research is aimed at reducing the risk of disclosure by allowing a user to create multiple profiles, ultimately limiting access to certain information based on the social group viewing the data. In this work, a new framework is proposed in which a user can create several profiles, each representing one digital persona and add friends or acquaintances to a profile. In addition, a user's postings or comments will be made through a profile. This separation, we believe, will allow a user a better control of their privacy and more freedom in posting without fear of disclosure to an unwanted audience. The first step of our work was to re-produce the Facebook platform including user account creation and profile definition. This step we believe will allow us to better understand the interactions between the various parts of the system so that they can be maintained under our new design.

Eric Wilson
Mentor: Daniel Vrinceanu
Investigation of Nuclear Magnetic Resonance in the Earth Field

This study was conducted to determine whether low field nuclear magnetic resonance (NMR) can be used effectively to solve many of the same problems that high field NMR solves, but at considerably less cost. This study focused upon calibrating the Magritek Terranova MRI device to image small objects, and learn basic NMR techniques. Before using the device, a stand had to be constructed out of wood to aid in orienting the NMR device in the Z-axis. By using water the system is set up to gain a signal of hydrogen, improve signal strength through shimming, and learn about J-coupling and chemical shifts. By using a small electromagnetic pulse it was possible to manipulate polarized nuclear spin properties of water, isopropyl alcohol, and boron trifluoride diethyl ethernate. These experiments were found to be successful by finding the identifying doublet markers of the isopropyl alcohol, finding that the hydrogen in water shows up at 2230 Hz, seeing the chemical signature of boron trifluoride diethyl ethernate, and getting 2D images of fruit (an orange and a lemon). This study showed that a compact Earth field NMR device is sensitive enough to be able to perform at a level useful enough to explore many of the same areas as high field devices, but at a fraction of the cost.

Ugochukwu O. Ezenekwe
Mentor: Mark C. Harvey
Modeling Stray Radiation Produced from an X-ray Therapy Unit

Over the years, conventional shield designs of radiation therapy rooms have varied in layout and structure. Therapy room designs were generally based on circular accelerator movement about the patient. To that end, primary radiation has been limited to the direction of the accelerator; whereas, produced secondary radiations freely scattered about the treatment room surfaces (e.g., floors, walls, ceiling). The purpose of this project was to calculate the energy and magnitude of scattered radiation produced external to room. The Geant4 Monte Carlo Toolkit (version 10.00) was used to (1) design the walls of a computer-simulated radiotherapy room and (2) simulate a source of photons consistent in energy with those produced from a conventional x-ray therapy unit. The photon source was positioned at a stationary point (i.e., isocenter) within the room and aimed directly at one of the walls. A detector consisting of Cesium Iodine (CsI) was placed just outside the room to detect the photons attenuated through the wall. For this extreme case, calculations were performed to assess the energy and magnitude of stray radiation penetrating the walls of this standard radiotherapy room layout. Our preliminary results suggest that there is leakage radiation (e.g., photons) external the radiotherapy room.

Aminata Dicko
Mentor: Yaqi Wanyan
Soil Parameters Associated With Longitudinal Cracking on Road Surface

Light weight structures, like low-volume roads, that are built over expansive soils experience frequent premature damage. Longitudinal cracking was reported by a district survey throughout Texas to be one of the most dominant types of distress. This is a critical issue in regions with expansive clays therefore it is imperative to have efficient prediction models that can aid engineers in improving structure performance. This study focuses on the findings from literature review regarding expansive soil behaviors, laboratory testing and longitudinal shrinkage cracking simulation. It also covers basic data analysis methods and preliminary results from different regions in Texas. The results are examined and compared in order to find trends and/or discrepancies. This analysis will be used in developing a flexible longitudinal cracking prediction model. Volumetric change in expansive soil is what causes damage to overlaying structures. Through previous research, it has been determined that certain parameters of expansive soil are related to one another. Moisture content was determined to be a parameter that had a strong relationship to a soil's expansiveness. The degree of change in moisture content is what causes the soil to undergo volumetric changes. The plasticity index of a soil was also found to be a parameter that is directly linked with its expansiveness. The degree of a soil's expansiveness increases as the plasticity index increases. So, the higher the plasticity, the more expansive the soil is.

Tedrick Wilson
Mentor: Erica Cassimere
Potential Role of p53 Tumor Suppressor in Chemosensitivity of Human Osteosarcoma Cells

Osteosarcoma (OS) is the most common malignant bone tumor in children and adolescents. Although recent advances using chemotherapy has improved the survival rate in OS patients, the survival rate has remained unchanged in the last three decades. Treatment with anti-cancer agents is used to halt cell cycle progression to allow for DNA repair. In cases where the damage is too severe, cells undergo programmed cell death, or apoptosis. Deregulation of DNA repair machinery is a classic feature of many human cancers. Thus, investigating pathways that affect DNA damage repair are important for identifying effective treatment for OS patients. p53 is a tumor suppressor protein that plays a pivotal role in both cell cycle arrest and apoptosis. Germline deletions or mutations of the p53 gene have been associated with cancer progression. Yet, whether p53 is required to sensitize osteosarcoma cells to anti-cancer agents remains to be elucidated. We hypothesize that p53 is required to promote cell death in osteosarcoma cells upon treatment with chemotherapeutic agents. Using MTT cell viability assays, we observed that U2OS human osteosarcoma cells, which express wild-type p53, were sensitive to treatment with DNA damaging agents such as etoposide and doxorubicin in a dose-dependent manner. To determine whether chemosensitivity is due to p53 expression, future studies will include knockdown of endogenous p53 protein expression in the U2OS cells and measuring cell viability in the presence of chemotherapeutic agents. In addition, the sensitivity of SAOS-2 cells (an OS cell line that is p53 null) to anti-cancer agents will be measured. Although still in its infancy, the results of this study may begin to shed light on whether p53 is a key modulator of chemotherapeutic cell death in human cancer.

2014 CBER STUDENTS AND FACULTY MENTORS

Undergraduate Student	Department	Mentor
Toluwani Adebayo	Biology	Shishir Shishodia
John Eunson Jr.	Biology	Jason Rosenzweig
Damon Hall	Transportation	Fengxiang Qiao
Joshua Holly	Computer Science	Oscar Criner
Reginald Johnson	Biology	Erica Cassimere
Bamidele Omidiran	Mathematics	Yunjiao Wang
Graduate Student	**Department**	**Mentor**
Sandeel Ahmed	Biology	Jason Rosenzweig
Courtney Blake	Environmental Science	Momoh Yakubu
Shari Galvin	Biology	Ayodotun Sodipe
Emma Hamilton	Computer Science	Oscar Criner
Duma Hlangothi	Environmental Toxicology	Mahmoud Saleh
Angelica Jimenez	Environmental Toxicology	Mahmoud Saleh
Carol Johnson	Environmental Science	Hyun-Min Hwang
Djene Keita	Environmental Science	Hyun-Min Hwang
Godswill Nwankwo	Computer Science	Wei Li
Olubukade Olaleye	Computer Science	Oscar Criner
Jeanne Robertson	Environmental Science	Momoh Yakubu
Mitchell Schnyder	Environmental Toxicology	Mahmoud Saleh
Michael Spidle	Biology	Fawzia Abdel-Rahman
Cara Woodham	Environmental Toxicology	Mahmoud Saleh

Student Biographies

Toluwani Opeyemi Adebayo attended Houston Baptist University in 2008 and graduated in May 2013, receiving a Bachelor of Science. In the fall of 2013, she shadowed Dr. Patricia Suarez D.D.S., a private practice dentist that teaches at University of Houston School of Dentistry. In Dr. Suarez's clinic, she saw many cases and procedures that further inspired her to pursue dentistry. Determined to become a dentist, she attended TSU classes as a post-baccalaureate student for the few remaining classes needed for dental school. This summer she is participating in NASA Center for Bio-nanotechnology and Environmental Research (CBER) Summer Research Program studying the effects of platinum group elements on p38 mitogen activated protein (MAP) kinase pathway in human lung epithelial cells.

John Eunson Jr. is in the process of completing a bachelor's degree in Biology. He has 6+ years experience as a pharmacy technician, having interest in the pharmaceutical/medical research programs, specific interest that pertains to the pharmacology program. He hopes to pursue a career in pharmaceutical or medical research/development with interest in pharmacology on the cellular/molecular level.

Damon Hall is a native of Houston, Texas. Damon played high school football before entering TSU. He currently majors in Maritime Science and Transportation. He would like to attend TSU's Transportation Graduate Program and then obtain a job at the Port of Houston.

Joshua Holly is a senior computer science major at TSU. After completing his bachelor's degree, Joshua plans to pursue his master's degree in computer science from TSU. He is currently a Jr. Information Security Analyst at the Office of Information Technology at TSU. While working for OIT, Joshua has developed various technical skills by working on projects in data security and data loss prevention. Joshua is also a cofounder of See Us Design LLC. See Us Design was created to help small businesses markets their products online. He is a 2013 President's Award Recipient for academics and was involved in the MIT App Inventor Workshop program, a workshop that teaches children how to program apps. After completing his bachelor's degree, Joshua plans to pursue his master's degree in computer science.

Reginald Johnson is a native Houstonian who has lived in that area his entire life. He attended Stephen Pool Waltrip High School all four years. As a first generation college student currently entering his sophomore year, he attends TSU. Reginald is majoring in Biology with a Chemistry minor. He holds a great fascination in human anatomy, neurorehabilitation and biomechanics research. His overall goal is to become a physical therapist who specializes in children rehabilitation. His high academic achievements have placed him on the President's List at TSU. In addition, with the support of his church family, Reginald launched a new organization on campus called Tigers for Christ, which leads weekly bible studies and joins with local churches to meet the needs of neighboring communities. In his spare time, he enjoys learning about nutrition and staying physically fit.

Bamidele Omidiran is a third year Economics major with a concentration in Mathematics at Penn and is a visiting student at TSU. Her main interests are calculus and linear algebra and in her free time, she enjoys tutoring others in mathematics and watching reruns of *Friends*. Upon graduation, Bamidele hopes to work in an industry that will allow her to employ her interest in mathematics and research.

Sandeel Ahmed is a native Houstonian and obtained his Bachelor of Science degree in Biology from TSU and is now a Master's degree candidate in the Biological sciences program with concentrations focused on Microbiology and more specifically, Bacteriology. He was accepted into the NASA Center for Bio-Nanotechnology and Environmental Research (CBER) and is a graduate research assistant under Dr. Jason A. Rosenzweig. He received the COST Faculty and Staff Scholarship for the 2013-2014 school year. His long term goals are either to apply for a Doctorate and/or second Master's degree program to further enhance his expertise in a science and/or health related field.

Courtney Blake was born in Monroe, Louisiana and raised in the small town of Ruston, Louisiana. She received a Bachelor of Science degree in Civil Engineering from Southern University and A&M College in Baton Rouge, Louisiana. She is currently a doctoral candidate in Environmental Toxicology at TSU. She is a member of Higher Dimension Church where she is heavily involved in the worship ministry as a praise and worship leader.

Shari Galvin is a native Virginian who received her Bachelor of Science degree in Biology from TSU. She is currently pursuing her Master of Science degree through the Biology Department and is also a graduate teaching assistant. As a graduate research assistant working with Dr. Sodipe, her current research is focused on gene expression of *Tardigrades* exposed to gamma radiation. In the spring of 2014, she received a COST award for Outstanding Graduate Student for the Department of Biology. In the same semester, she became a NASA Center for Bio-Nanotechnology and Environmental Research (CBER) fellow. Although she is interested in attending medical school, she would like to earn a MD/PhD degree and pursue a career involving medical research.

Emma Bahareh Hamilton was born in Iran. She is graduated from the Science and Technology University in Iran with a bachelor in computer science and a minor in Mathematics. She moved to Houston, Texas in 2008. Currently she is second year graduate student of Computer Science in TSU. She is looking forward for an opportunity to continue performing research in relative fields such as, "Big Data", using Apache™ Hadoop® to sort and save information, Open-Source software to maintain reliable, scalable, and distributed computing for Big Data. Emma Hamilton is an active member of several extracurricular organizations as well as "American Physic Association". She has enjoyed working with research groups of "Texas Southern University Center" on Complex Networks (CRNC) and NASA URC (C-BER). When she is not overloaded with coursework and studying, she dedicates her time by volunteering to help her community in any events, charity fundraisers, and workshops. After graduation from TSU, she plans to earn a PhD degree in Computer Science from University of Texas in Austin.

Duma Hlangothi was born and raised in South Africa, and relocated to Houston Texas in the Fall of 1997. He earned his Bachelor and Master degree in Chemistry at Texas Southern University. Duma is a PhD student at TSU majoring in Environmental Toxicology and working as a NASA-Cber graduate research assistant. His research interest at TSU includes medicinal plants and analytical instrumentation. Presently, he is working on analyzing phytochemicals from the plant Dodonaea *Viscosa* to improve human health using various analytical instruments such as; Microwave extraction, GC-MS, LC-MS, HPTLC-MS, and GC-IR. He has been involved in community service with respect to children and teens as a teaching assistant. He loves playing tennis, golf and enjoys traveling.

Carol B. Johnson is a graduate student in Environmental Toxicology at TSU. She is a native Houstonian who received her undergraduate degree in Biology from TSU. She is a student member of the American Society of Plant Biologist. Her research focuses on polycyclic aromatic hydrocarbons and n-alkanes. Upon completion of her graduate degree, Carol plans to begin a career as a researcher.

Angelica Jimenez was born in Santo Domingo, Dominican Republic. At the age of 8 years old, her family moved to the Bronx, New York. Angelica completed her undergraduate coursework at The College of New Rochelle in New York and then worked as a geriatric social worker. She moved to Houston, Texas in 2012 to enroll at TSU to purse a degree in Chemistry. She has just completed her second semester in graduate school and works as a Chemistry Teaching Assistant and as a Graduate Library Assistant at the Robert J. Terry Library at TSU. Her current graduate research is about Polycyclic Aromatic Hydrocarbons in coffee and Volatile Organic Compounds in candle wax. Once, she obtains her masters in Chemistry, she hopes to enroll in the Environmental Toxicology Doctoral Program at TSU.

Djene Keita is graduate student at TSU pursuing her master degree in the Environmental and Interdisciplinary Sciences Program. She is a native Houstonian who received her B.S. degree from TSU in Biology. She is currently a biology graduate teaching assistant and is working on her research in Dr. Hwang's lab determining levels of antimicrobial by-products released into receiving waters from wastewater treatment plants. In the spring of 2013, she was named outstanding graduate student in Environmental Toxicology. She plans on pursuing her Ph.D. in the Environmental Toxicology Program. Her dream is to work for international organizations such as United Nations Environmental Program and World Health Organization.

Godswill Nwankwo obtained his Bachelor's degree in Mechanical Engineering from the Rivers State University of Science and Technology in Nigeria. He is currently a graduate student of Computer Science and will be earning his Master of Science degree in fall 2014. He is a graduate teaching assistant, where he tutors students in engineering and advanced Mathematics, college statistics, applied physics and physical chemistry. He is also an oil and gas entrepreneur and he engineers and executes oil and gas drilling projects for clients in these areas. His academic goal is to acquire a PhD in Petroleum Engineering.

Olubukade Olamide Olaleye received his Bachelor's degree in Computer Science and Economics from Obafemi Awolowo University, Nigeria. He currently is a master's student of Computer Science at TSU. In his spare time, he enjoys playing soccer and hanging out with friends. His career goal is to become Senior Telecommunication and Network Engineer.

Jeanne Robertson is originally from New Orleans, Louisiana and relocated to Houston in 1987. She graduated from James Madison Senior High School and completed three professional years in the Doctor of Pharmacy program at TSU, before discovering her love for biology. She later obtained a Bachelors of Science degree in Biology with a minor in Chemistry from TSU in 2011. Jeanne is currently enrolled in the Environmental Toxicology program at TSU working towards a Master of Science degree. In her spare time, Jeanne creates and sells one-of-a-kind artistic jewelry and she is a certified makeup artist.

Mitchell Schnyder is a candidate for his Masters in Chemistry at TSU and is the first in his family to achieve the honor. Mitchell is a native Houstonian and completed his Bachelors of Science in Chemistry at Texas Southern University. Mitchell works as an organic chemistry teaching assistant and as a research assistant under his mentor Dr. Saleh. Mitchell is a part of the American Chemical Society. Mitchell's other interests include nutrition, athletic development, and swim instruction. His goal is to be a teacher and leader of students.

Michael Spidle is a native Houstonian who attended TSU for his undergraduate studies and successfully completed his Bachelor of Science in Chemistry. He is currently a master's student in the Environmental Toxicology program at TSU. He is a current Fellow, and former scholar, for the NASA URC Center for Bio-nanotechnology and Environmental Research (C-BER). Michael is also a member of the Kappa Psi Omega fraternity, Inc., and has previously held the position of National Vice President. His long-term goal is to pursue a career in the research field, specializing in oncology.

Cara Woodham was born and raised in El Paso, TX and moved to Houston to obtain her Bachelor's degree from TSU in 2010. Cara has completed her third semester in the graduate school and plans to graduate with her Masters in Chemistry from TSU in December of 2014. She has spent the duration of her years in the Master's program working in Dr. Mahmoud Saleh's laboratory. Cara has worked for the Chemistry department at TSU as a teaching assistant, introducing undergraduates to laboratory equipment and safety protocol. She hopes to continue doing research and become a surgeon upon completion of her MS degree.

Student Abstracts

Toluwani Adebayo
Mentor: Shishir Shishodia

Effect of Platinum Group Elements from Road Dust on P38 Protein Expression

Platinum-group elements (PGEs), specifically Platinum, Palladium, Rhodium, and Vanadium are released into the environment as minute particles from car catalytic converters. The purpose of this study is to investigate the effect of the PGEs on the p38 pathway in human lung epithelial cells (H1299 and A549). As one of the four members of the mitogen activated protein kinase (MAPK) family, p38 plays a critical role in the regulation of cellular activities such as cell differentiation, autophagy and apoptosis as well as signal transduction. P38 responds to extracellular stress stimuli like heat, Ultraviolet light, osmotic shock, lipopolysaccharides, pro-inflammatory cytokines, and growth factors. We hypothesized that PGEs would have an adverse effect on lung cells and thus have the potential of harming the whole body. We expected PGE exposure would activate p38 and its pathway. Proteins were extracted from human lung epithelial H1299 and A549 cells grown in media with and without road dust at different time intervals of 0, 4, 8, 12, 24, 48 and hours. Western blot analysis was carried out on protein extracts using specific primary antibodies for p38. A biphasic activation of P-p38MAPK was characterized by an initial activation at 6 hours then a delayed and more sustained secondary activation from 24 hours in A549 cells. In H1299 cells the P-p38 expression also showed significant change and activation. This study shows that p38 is expressed and activated in the presence of PGEs.

Damon Hall
Mentor: Fengxiang Qiao
Using Smartphone Applications to Alert Drivers of Traffic Signal Information Under Fog Weather Conditions

In addition to communication, many people rely on their smartphones for their everyday routine, like appointments, note taking, financial budgeting, directions, and much more. Smartphones are constantly adding or upgrading their phone applications. Our studies focus is to develop an application to help decrease fatal accidents at intersections by reducing driver distraction. This particular application can be installed on a personal smartphone to notify the driver of upcoming lights. In conducting the research a simulator was used for testing. The driver can determine how many seconds it will take for each light to change. The application can also be a great help to drivers in severe weather conditions such as fog, where drivers are more cautious while approaching an intersection and decrease their speed. If the weather condition is foggy, the driver may not see the traffic light ahead of them, but they can determine if the traffic light will be green or red.

Reginald Johnson
Mentor: Erica Cassimere
The Effects of DNA Double Strand Break-Inducing Agents on Metastatic Osteosarcoma Cells

Osteosarcoma (OS) is an aggressive bone malignancy that affects adolescents and young adults. Currents treatments include a combination of surgery with radiation therapy or chemotherapy. However, despite these treatments, highly metastatic OS tumors are prone to tumor relapse and lung metastases, both of which result in poor patient survival. Therapies to target cancer cells often induce DNA double strand breaks (DSBs) and activates the DNA damage response (DDR). In the DDR, a cascade of signaling events stop cell cycle progression to repair damaged DNA, or cells will undergo apoptosis if the damage is irreparable. One protein involved in activation of the DDR is DNA-Protein Kinase Catalytic Subunit (DNA-PKcs). Previous reports have shown that loss of DNA-PKcs sensitizes U2OS non-metastatic osteosarcoma cells to agents that induce double strand breaks. However, the effect of DNA -PKcs loss on chemosensitivity of highly metastatic OS has yet to be determined. In this study, we treated Krib human metastatic OS cells with topoisomerase II inhibitors, etoposide and doxorubicin, to induce DNA DSBs. DNA damage was assessed by immunofluorescence using a γ-H2AX antibody, which localizes to sites of DNA damage. The viability of Krib cells with DNA damaging agents was measured using MTT assays. Although Krib cells remained viable after 24 hr, we observed that Krib cells were unexpectedly highly sensitive to chemotherapeutic agents at 48 hr independently of DNA-PKcs status. Future, studies would include chemical inhibition of DNA-PKcs prior to DSB induction to test whether sensitivity is similarly affected. Thus far, these data suggest that other proteins involved in the DNA damage response may contribute to the metastatic potential of osteosarcomas.

Bamidele Omidiran
Mentor: Yunjiao Wang
Relations Between Dynamics of Boolean Network and Networks of ODEs

This study examines the dynamics of two types of mathematical models used to model gene regulatory networks: Boolean Network systems and Ordinary Differential Equation (ODE) systems. Much of the existing work on dynamics of Boolean Networks and ODEs discusses the relationship between the stable fixed points of the Boolean network and equilibria of coupled ODEs. We expand on this work by identifying commonalities and differences in the aspects of dynamics of Boolean and ODE systems. One aspect of particular interest that we compare are the conditions that are necessary to have oscillating behavior Boolean and ODE systems. By comparing the dynamics of three-node network systems, we show that knowledge gained from studying the dynamics of Boolean system provides guidance for developing associated ODE models. We finally demonstrate that networks of ODEs can model more detailed dynamics that cannot be captured by Boolean systems. Ultimately, using such mathematical modeling, promises to be an invaluable tool to gain new insight into gene regulatory network dynamics. Proper understanding of network dynamics can lead to new treatments of a wide range of diseases.

John Eunson Jr.
Mentor: Jason Rosenzweig
Effect of Platinum Group Element-exposure on a gut microbiome model system using *Pseudomonas aeroginosa*, *Enterococcus faecalis*, *Escherichia coli,* and HT29 cells

Platinum Group Elements (PGEs) are emitted from vehicles by way of catalytic converters. What is relatively unknown is whether PGEs might affect bacterial growth. We were curious as to whether PGE could impact the gut resident flora following ingestion of PGE containing house dust. To model such a scenario, we exposed Pseudomonas *aeroginosa* (a Gram-negative opportunist pathogen), *Enterococcus faecalis* (a Gram-positive opportunistic pathogen), and *Escherichia coli* (a Gram-negative normal flora resident) to house dust (Sigma) (containing PGEs) during a co-culture with HT29 gut epithelial cells. HT29 cells are an epithelial human colorectal adenocarcinoma cell line sometimes used in absorption, secretion, and transport assays of gut cells. With the exception of *E. coli*, the enteric bacteria studied are opportunistic pathogens. Following a 6 hour co-culture, HT29 cells were lysed with water, and viable bacteria were quantified to determine the effect of PGE on overall growth. Future studies will include additional replicates as well as the characterization of mixed bacterial cultures co-cultured with HT29 cells following PGE exposure, thereby better modeling the gut microbiome environment.

Godswill Nwankwo
Mentor: Wei Li
Identification of Sensor Nodes in WSN

Wireless sensors networks (WSNs) are traditionally composed of large number of low-cost and tiny homogenous sensors nodes connected through a wireless network that gather data to be treated locally or relayed to the sink node through multi-hop wireless transmission. These networks are used for several applications such as traffic monitoring, surveillance, acoustic and seismic detection, environmental monitoring, etc. Some issues are very critical due to server and sensor resources constraints like efficient energy, stock limitation and lifetime of network. Several solutions were proposed to minimize the traffic into network. Clustering algorithms have been widely used to reduce energy consumption. Energy consumption is ranked among the major problems of research in distributed systems, including sensor networks. The majority of this research has been focused on the study protocol and algorithms that addresses these issues.

Courtney Blake
Mentor: Mohoh Yakubu
The Anti-Cancer Activities of Kolaviron in Human Lung Cancer Cell Lines A549 and H1299

Kolaviron (KV), a natural biflavonoid obtained from the seeds of Garcinia kola, has been noted for its diverse pharmacological actions such as its antioxidative and anti-inflammatory activities. Lung cancer has been the leading cause of cancer deaths in the USA and the processes involved in cancer growth are known to involve some of these pathways. This study investigates the possible effects of KV on A549 and H1299 cancer cell lines. MTT assay analysis of cells after KV (25ug/mL - 1 mg/ mL) showed significant anti proliferative and cytotoxic effects on these cell lines at 24, 48, 72, and 96 hours respectively. PKC and cAMP pathways in activation of signaling pathways for the H1299 and A549 growth will be exploited in order to understand the mechanism of action of KV. These preliminary results suggest that KV has the therapeutic potential against lung cancer.

Emma B Hamilton
Mentor: Oscar Criner
Analysis of Shock Propagation in Large Lattices Driven by Big Data Using a High Performance Computer

The goal of the research program was to construct generalized multi-dimensional lattice or "mass-spring-dashpot" (MSD) models for use in simulations of phenomena or reduction of data using high performance computing. Models of this type are used in many fields of science and engineering. This class of models can be used to solve the differential equations of the dynamics of a large number of phenomena or model a large number of dynamic time series.

Duma Hlangothi
Mentor: Mahmoud Saleh
Dynamic Microwave Extraction of Essential Oil from Medicinal Plant Dodonaea *Viscosa*

Microwave extraction is becoming the choice for the extraction of a diverse array of solid matrices for organic analyte analysis by GC-IR, GC-MS, HPLC, and other analytical techniques. Since it operates at a wide range of temperature and pressure than traditional Soxhlet and sonication technologies, it can be applied to a broader range of samples. Microwave extraction of the leaves, stems, branches, roots and seeds of Dodonaea *Viscosa*, were extracted using various solvent mixtures and heated to their recommended temperature. The objective is to evaluate the extracted material and compare different methods of extraction; percolation, accelerated solvent extraction, super critical fluid and microwave extraction to identify which method is the most economical, easiest to use and yields a higher percentage of extract. The extracts from these four different methods would be further analyzed for Antioxidant and Antiviral activity.

Angelica Jimenez
Mentor: Mahmoud Saleh
Determination of Volatile Organic Compound and Polycyclic Aromatic Hydrocarbons in Candle Burning Emissions

A comparative study using 31 commercially available scented candles was done for the purpose of determining chemical composition of volatile organic compounds (VOCs), volatile fragrance compounds, semi-volatile organic compounds (SVOCs) and polycyclic aromatic hydrocarbons (PAHs). VOCs, SVOCs and PAHs are indoor and outdoor pollutants and are considered to be carcinogenic and mutagenic. With the increase in candle use, comes public concern about potential health effects due to the exposure to candle emissions and to fragrances. The candles were analyzed using head space gas chromatography mass spectrometry (HS GC-MS) and the chemicals were identified using mass spectral library of the National Institute of Standard Technology (NIST), a library search software version. Some of the VOCs that were identified are 2-propenal, 3-carene, β-pirene, 2-(1, 1-dimethylethyl)-cyclohexanol, 3-hexenyl ester, hexanoic acid, benzene and 2-propenoic acid. For volatile fragrance compounds, cinnamaldehyde, eugenol and linalyl acetate were present. The chemical identified for SVOCs was diethylphthalate and for PAHs were benzo[h]quinoline, styrene, naphthalene, and anthracene.

Carol Johnson
Mentor: Hyun-Min Hwang
Chemical Fingerprinting for Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons (PAH) are environmental toxins that have carcinogenic and mutagenic properties. These compounds are derived from petrogenic sources such as oil and from pyrogenic sources such as combustion. Chemical fingerprinting of PAHs at the site of an oil spill can provide useful information about the environmental impact of these compounds. To investigate petrogenic PAH levels, sediment samples were collected from six sites along the shoreline in the vicinity of a recent bunker oil spill in Galveston, Texas. Sediment samples were also collected from eight bayous in Houston, Texas. All samples were analyzed for PAHs using gas a chromatography equipped with a mass spectrometer (GC/MS). Higher PAH concentrations were observed in the sediment collected near the oil spill than in sediment collected a greater distance from the spill (the bayous). The PAH profiles were similar among the eight bayous. Quantification of these PAHs provided data about the source of the PAHs. The higher percentage of low molecular weight PAHs may indicate that these PAHs were from petrogenic sources. PAHs in sediment collected from sites near the oil spill site appear to originate from petrogenic sources.

Shari Galvin
Mentor: Ayodotun Sodipe
Repair Gene Expression in *Hypsibius Dujardini* Exposed to Gamma Radiation

Tardigrades are extremophiles that are able to withstand varying degrees of environmental stresses and survive. They are able to do this by entering a reversible ametabolic state known as “cryptobiosis”. Within this state they are able to tolerate very high doses of UV and gamma radiation. Photorepair (phr) genes are enzymes known as photolyase. These DNA enzymes are known to repair UV-light induced mutations through a light-dependent reaction mechanism in other organisms, but relevance in *H. dujardini* is still relatively unknown. In this present study, *H. dujardini* was exposed to varying levels of radiation and RT-PCR will be used to determine the expression of the photolyase enzyme, phr. Further investigation is needed to interpret the current data obtained, so that we may understand the relevance of this gene within this species.

Djene Keita
Mentor: Hyun-Min Hwang
Time-Series Changes of Triclosan and Triclocarban in Brays Bayou, Houston Texas

Polychlorinated aromatic antimicrobials such as triclosan (2, 4, 4' –trichloro-2'-hydroxydiphenyl ether) and triclocarban (N-(4-chlorophenyl)-N-(3, 4-dichlorophenyl)-urea) are persistent in the environment, bioaccumulative, and poses ecological health risk. Recent studies have also shown that triclosan (TCS) and triclocarban (TCC) can affect human health by promoting developmental and reproductive toxicity, inhibition of muscle function, and endocrine disruptions. The usage of antimicrobial and antibacterial products; such as soaps, toothpaste cosmetics and detergents; is steadily increasing most of which are washed down the drain after use, and become part of the wastewater treated in municipal treatment plants. TCC and TCS incomplete removal by wastewater treatment facilities makes them among the top 10 contaminates in surface waters. The aim of this study is to investigate impacts of effluents from a wastewater treatment plant on water contamination in Brays Bayou by TCS and TCC. Surface water samples were collected from Alief downstream of an effluent outfall pipe every hour starting from 6:00 AM to 8:00 PM. Reference samples were also collected from above the outfall. Each water sample was extracted using a C_{18} solid phase extraction (SPE) cartridge and analyzed using gas chromatograph-mass spectrometer (GC/MS). Concentrations were high in the morning until 9:00 AM, decreased throughout the day and raised again around 6:00 PM. Concentrations are likely associated with the presence of people in their homes where they use antimicrobial products such as soaps and detergents. This suggests that TCS and TCC found in surface water in urban watersheds can be used as marker compounds for evaluating contamination by wastewater treatment effluents.

Jeanne Robertson
Mentor: Momoh Yakubu
Cytotoxicity and Anti-proliferative Effects of Diruthenium Complex

Lung cancer is the leading cause of cancer incidence and mortalities in the United States of America. Cisplatin is the drug of choice in treating lung cancer; however, resistance and adverse side effects have prompted the urge to develop alternatives. The diruthenium complex has been developed to treat cancer that exhibit resistance to Cisplatin. The purpose of this study is to determine if the diruthenium complex is effective in treating Cisplatin resistant solid tumor lines. In vitro testing was completed on Cisplatin resistant human lung adenocarcinoma epithelial cells (A549) to determine the cytotoxic and anti-proliferation behavior of the diruthenium complex on A549. MTT assays were utilized to investigate the dose-time effects of diruthenium on cell viability and proliferation. Diruthenium in various concentrations (10nM, 1uM, 10uM, 50uM, 100uM, 1mM, and 10mM) showed remarkable results in inhibiting the cell proliferation and exhibited notable cytotoxicity effects. The cytotoxic effect of diruthenium was also evaluated in the presence of Calphostin-C 10^{-4}, a potent PKC inhibitor, and a cAMP inhibitor and displayed remarkable results. The findings of this study show that diruthenium has promise of being used as a chemotherapeutic agent in tumors resistant to Cisplatin.

Mitchell Schnyder
Mentor: Mahmoud Saleh
Ion Chromatography Method for the Determination and Quantification of Six Monosaccharides

Naturally occurring carbohydrates commonly exist as complex mixtures. The analysis of carbohydrate composition in animal and plant samples offers potentially important information as biomarkers; however, the chromatography of carbohydrates can be problematic. A rapid, sensitive ion chromatography (IC) method with pulsed amperometric detection was developed for the quantitative determination of six monosaccharides at µgL-1 levels. The samples were chromatographed on a Thermo ScientificDionex CarboPac™ PA20 column with an isocratic mixture of 10mM NaOH and type 2 American Society for Testing and Measures (ASTM) water. A calibration table was constructed for the analysis of D-arabinose (Ara), D-fructose (Fru), D-galactose (Gal), D-glucose (Glc), D-mannose (Man), and D-ribose (Rib) using serial dilutions and Chromeleon software. This method demonstrated separation and high resolution at low µgL-1 levels.

Michael Spidle
Mentor: Fawzia Abdel-Rahman
The Effects of Gamma Radiation using *Caenorhabditis elegans* as a Model Organism

Gamma rays are the strongest types of radiation and can ionize tissue directly while causing various health effects and complications such as acute radiation syndrome (ARS), radiation sickness, cancer, decreased fertility, and death. The focus of this study was to study the effects of Gamma radiation using *C. elegans* as our model organism, because they are known to be resistant to radiation. We specifically examined reactive oxidative species (ROS), lifespan, and progeny development. Nematodes were exposed to gamma radiation at a dose of 0.1 Gray per day for a length of 5 days and 7 days respectively, giving a total dose of 0.5 Gray and 0.7 Gray. Dichlorofluorescin diacetate (DCFDA), a common fluorescent dye used to detect ROS, was added and measured using a spectroflourometer at an excitation of 483nm and emission 538nm. Experiments to measure lifespan, progeny, and ROS due to radiation damage are currently in progress.

Cara Woodham
Mentor: Mahmoud Saleh
Determination of Volatile Organic Compounds in Alcoholic Spirits

Twenty different alcoholic spirits were evaluated to determine their chemical volatile organic compounds constituents (VOCs) using a headspace sampler gas chromatography mass spectrometry (HSGC -MS). VOCs are a large group of organic compounds that some of them have been established to be mutagenic and/ or carcinogenic. Several VOCs were found in each of the various alcoholic samples. 85 chemicals were identified using NIST mass spectral library software on selected peaks. 37 of these chemicals were identified to be VOCs by comparing this data to the data of previous literature. The VOCs, ethyl acetate and diethyl acetate were identified in all alcohol samples and isopentanol and 2-methylbutanol were observed in the majority of the samples. A total of 13 VOCs were identified in the four tequila samples, 32 VOCs were observed in the whisky samples, and 16 VOCs were identified in the other (rum, cognac, and brandy) five samples. The VOCs identified can be classified as an alcohol, aldehyde, ester, ether, ketone, hydrocarbons, or a furan. Methyl arachidonate, fatty acid, was identified in some of the samples that were analyzed.

2014 NSF-RISE STUDENT S AND FACULTY MENTORS

Undergraduate Student	Mentor
Jelili Adebisi	Shishir Shishodia
Donyeil Hoy	Hyun-Min Hwang
Tan Nguyen	Hyun-Min Hwang
Kelvin Obimah	Jason Rosenzweig
Anita Ofori	Shishir Shishodia
Jay Saynonh	Hyun-Min Hwang

High School Student	Mentor
Sloan LaLinde Barnes	Jason Rosenzweig
Selina Hernandez	Shishir Shishodia
Amrutha Immadi	Shishir Shishodia
Laura Lay	Hyun-Min Hwang
Sachindra Sanamvenkata	Jason Rosenzweig

Student Biographies

Jelili Adebisi was born in a small town called Ile-oluji, Ondo-State of Nigeria. He relocated to the USA in August 2010. He will be graduating in the Spring of 2015 with a major in biology and hopes to attend medical school. He is in the Early Medical School Acceptance Program at the University of Texas Medical Branch at Galveston, Texas.

Donyeil Hoy majors in Chemistry at TSU. When he was in his sophomore year of high school, his chemistry teacher recommended him for the NanoChallenge Program at the University of Illinois where he was first exposed to scientific research. From there, he has held research positions with the Department of Defense, Spelman College and the University of Illinois at Urbana-Champaign NanoCEMMS program. After he finishes his B.S. in Chemistry, he plans to attend graduate school for a Ph.D. in Biomedical Engineering with a focus on nanotechnology and drug delivery systems. His long term career plans includes funded research in the area of drug design and synthesis, drug delivery systems, and toxicology.

Tan Nguyen graduated from DeBakey High School, Houston, Texas. He began noticing the financial gaps in the various strata of society as well as the lack of healthcare for many people early on in his life that inspired him to pursue a career in health profession. When he was informed about the summer program, he grabbed this opportunity to gain experience in a research environment as a pre-requisite to pursue a medical career. After completing medical school, he plans on going back to his Vietnamese roots and help the people who cannot afford quality healthcare.

Kelvin Obimah is a first generation student from his family to attend college. He is a third year Pre-Pharmacy student with a focus in Biology at the University of Texas - Austin. Outside of the classroom, Kelvin is a mentor and a tutor for high school students through an organization called Students for Education and Community Advancement, or SECA. He is also a lead dancer in the African Student Association's premier dance team at his school. Kelvin is heavily involved in Black Health Professions Organization at the University of Texas where he is part of the Health Symposium Committee that primarily reaches out to other pre-health organizations on campus and engages with representatives from the various Medical, Pharmacy, Optometry and Dental schools in Texas.

Anita Ofori, born in Accra, Ghana, came to the United States in 2010 and began her college education at Texas Southern University in 2011 as Biology major. Anita has been a member of the Science and Technology Enhancement Program (STEP) at TSU since 2011, making the honor's list in conservative semesters, a recipient of the TSU COST scholarship for 3 consecutive years, and a member of the Early Medical School Acceptance Program at UTMB, Galveston through which she has had numerous experiences shadowing local physicians. She is also part of campus organizations such as the Lighthouse Campus Fellowship where she holds an administrative position. Anita has volunteered at the Houston food bank, the Assisted Living in the Houston Areas, and also volunteers at the Houston Methodist hospital where she works in the cardiovascular unit educating patients on their heart conditions.

Jay Saynonh graduated from Michael E. DeBakey High School for Health Professions in June 2013 and attends TSU as a Biology major in the Thomas F. Freeman Honors College and a National Science Foundation and Science and Technology Enhancement Program (NSF-STEP) Scholar. He aspires to become a physician through the Early Medical School Acceptance Program (EMSAP) in partnership with University of Texas Medical Branch in Galveston, TX. He is active in various organizations on campus such as Health Occupation Students of America and Beta Beta Beta Biological Honor Society. Jay also volunteers at Texas Children's Hospital with Radio Lollipop by assisting children in play by handing out supplies for craft projects or supervising activities and games in the Radio Lollipop playroom. He also shadows and volunteers with physicians at Texas Children's Hospital in the Intensive Care Unit and at Ben Taub General Hospital in the Emergency Center, where he manages to acquire first-hand experience with patients and the hospital setting in turn gaining exposure to broaden his knowledge in medicine.

Sloan Lalinde-Barnes is a senior at DeBakey High School for Health Professions. She is primarily interested in biology and aspires to be a physician and work in emergency medicine. She is a member of Health Organization Students of America and volunteers at Texas Children's Hospital as well as with various animal rescue groups.

Selina Hernandez is a junior at DeBakey High School for Health Professions. She will be the first in her family to go to a university and to pursue a career in health sciences. She enjoys reading books, playing cello, and spending time with her family during her spare time. She is currently a member of the American Red Cross and has volunteered for other organizations, such as the League of United Latin American Citizens or LULAC, where she mentored middle school students in science and math courses. She is also a volunteer as a mentor for a NASA program in the University of Houston where she was a teaching assistant for an astronomy class for middle school students during the summer as well. Her career goal is to become an ER physician.

Amrutha Immadi is currently a senior attending DeBakey High School for Health Professions. In her free time, she enjoys volunteering at Memorial Hermann and Methodist Hospitals, where she has contributed more than 150 hours, read books, play the piano, draw, and play volleyball. She holds many leadership positions, such as president for her HOSA chapter, secretary for Model UN/Academic World Quest, youth service corps, advisor for the Houston Mayor Youth Council, webmaster for the Debate and Forensics Team and being a member of National Honor Society, American Red Cross, and Math & Science Club. She was also recently recognized nationally in the Top 10 for a HOSA (Health Occupations Students of America) competition and won 1st place in her school wide science fair and 3rd place at Science Engineering Fair of Houston (SEFH). She aspires to join the medical field and become an oncologist with a specialty in pediatrics.

Laura Lay is a high school senior at Michael E. DeBakey High School for Health Professions. She has a profound interest in the life sciences and intends to pursue a career in the field of research or medicine. Not only is Laura an AP scholar, she is also actively involved in organizations such as National Honor Society and Health Occupation Students of America. In her spare time, she enjoys writing, reading, and ruminating over the meaning of life.

Sachindra Sanamvenkata attends DeBakey High School for Health Professions. He will be in the 11th grade in the current academic year. His research interests include cancer biology, biochemistry, and microbiology. He plans to become a medical scientist (MD, PhD) focusing on oncology. In his free time, he enjoys swimming, reading, volunteering, and building and programming computers.

Student Abstracts

Anita Ofori and Jelili Adebisi
Mentor: Shishir Shishodia
Platinum Group Metals found in Road Dust activate p42/44 MAP Kinase Pathway

Platinum-group elements (PGE), specifically Platinum, Palladium, Rhodium, and Vanadium are released into the environment as minute particles from car catalytic converters. Animals and plant species are in danger of toxicity from over exposure to these metals. It is well known that the p44/42 MAPK signaling pathway is activated by mitogenic stimuli. The activation of p42/44 MAPK signaling has been reported to mediate stimulation of DNA synthesis, suppression of DNA synthesis, and suppression of apoptosis in hepatocytes depending on the tone, duration and stimulus. The purpose of this study is to investigate the effect of the PGE on the p42/44 pathway in human lung epithelial cells (H1299 and A549) exposed to road dust at the various time intervals. Whole cell extracts were extracted from human lung epithelial cells H1299 and A549 exposed to road dust at 0, 4, 8, 12, 24, 48 and 72 hours and Western blot analysis was performed. The results show that PGE induces the activation of p42/44 MAPK in a time dependent manner with significant activation observed at 48 hours exposure.

Kelvin Obimah
Mentor: Jason Rosenzweig
Platinum Group Elements Found in House Dust Negatively Influence Bacterial Oxidative Stress Repsonses

Since the late 20th century, platinum group elements (PGEs), including platinum, rhodium, and palladium, have been used in catalytic converters of vehicles as air pollutant prevention agents. Unfortunately, recent evidence has indicated an upward trend in the accumulation of PGEs emitted from vehicles on roads and highways. Furthermore, recent studies have also shown the accumulation of PGEs indoors. When one is exposed to PGEs, not only are host cells (eukaryotic) potentially influenced, but also prokaryotic residents of the human microbiome. The goal of this study was to assess the effect of house dust (containing PGEs) on three opportunistic gut bacteria (*Escherichia*, *coli*, *Enterococcus*, *faecalis*, and *Pseudomonas aeruginosa*). More specifically, we evaluated whether house dust (containing PGEs) influenced the aforementioned organisms' responses to subsequent oxidative stress–a condition bacteria commonly encounter when interacting with host immune cells. This is the first study to investigate the physiological response of bacteria exposed to PGE and oxidative stress. Interestingly, house dust sensitized gut microflora to oxidative stress. More specifically, the presence of house dust at a range of concentrations resulted in a lower threshold to oxidative stress resistance. The implication of this finding is that house dust could create an imbalance in the human gut flora, potentially resulting in the loss of the many benefits the human gut flora provides.

Sloan LaLinde Barnes
Mentor: Jason A. Rosenzweig
The Effect of Platinum Group Elements Found in House Dust on Bacterial Biofilm Production

Platinum Group Elements (PGE's), including platinum, palladium, and rhodium have emerged as some of the primary pollutants of the 21st century. Recent studies have shown that these nanoparticles, which are typically used in catalytic converters to capture toxic emissions from motor vehicles, leak into the environment and can be consequently ingested or inhaled. If ingested, it is possible that PGEs could negatively impact the human gut microbiome, many residents of which are capable of producing biofilms, a sticky extracelluar, polysaccharide secreted matrix. Biofilms are communities of bacteria adhered to a surface. Biofilm associated bacteria are more resistant to antibiotic stress and are very efficient at evading host defenses. In this study, the effects of house dust and road dust were examined for biofilm production of three opportunistic gut bacteria (*Escherichia coli*, *Enterococcus faecalis*, and *Pseudomonas aeruginosa*). Nutrient conditions in the human body and in the environment were modeled in this study using nutrient rich and nutrient poor media, respectively. It was observed that both house dust and road dust resulted in increased biofilm formation by all three bacterial strains. Nonetheless, house dust led to the production of a more robust biofilm than road dust. This implies that PGEs pose a potential health concern as they increase the virulence potential of opportunistic gut bacteria through enhanced biofilm formation.

Selina Hernandez
Mentor: Shishir Shishodia
Road dust activated Nuclear Factor kappa B in Lung Epithelial Cells

Individuals may not be aware of the possible threat that automobiles have on the population's health. Automobiles produce platinum group elements (PGE) that go into the air we breathe, the soil used for the food we grow and consume and finally in the water source that individuals use every day. The main focus of our study is to determine the effect of PGE specifically Platinum, Vanadium, Rhodium, and Palladium on the human body. In an inactive state, NF-kB is present in the cytoplasm as a heterotrimer consisting of p50, p65, and IkBa subunits. In response to an activation signal, the IkBa subunit is phosphorylated at serine 32 and 36 by IkBa kinase (IKK), ubiquitinated, and degraded through the proteosomal pathway, thus exposing the nuclear localization signals on the p50-p65 heterodimer. The p65 protein is then phosphorylated, leading to nuclear translocation and binding to a specific sequence in DNA, which in turn results in gene transcription. We investigated the effect of the PGE on the IκBα degradation and NF-kB (p65) translocation from the cytoplasm to the nucleus in A549 lung epithelial cells exposed to road dust at the various time intervals: 0, 5, 10, 15, 30 and 60 minutes. Nuclear and cytoplasmic protein extracts were collected and Western blot analysis was performed on both extracts. Our immunoblot analysis revealed that upon exposure to road dust, p65 gets translocated from the cytoplasm to the nucleus.

Amrutha Immadi
Mentor: Shishir Shishodia
JNK Expression in Lung Epithelial Cells after Exposure to Platinum Group Elements found in Road Dust

Catalytic converters in vehicles constantly release platinum group elements (PGE), causing them to accumulate heavily in the natural world. Once these PGE are released, they settle as particulate matter (PM) that can be inhaled and easily absorbed by lung epithelium, thereby causing serious inflammation. Although it is known that continual contact with chemicals such as Platinum (Pt) is carcinogenic, the toxicity of anthropogenic Pt present in nature is not well known. Thus, it is vital to examine how repeated chronic exposure to PGE released into the environment affects human health. Under environmental stress, signaling pathways are activated to protect or destroy the cell. The aim of our research project was to characterize the bio-molecular response to environmental stress, by first examining how cell growth is affected by the presences of PGEs found in road dust. Secondly, we examined whether certain pathways, such as phosphorylation of JNK known to cause apoptosis will be activated in human lung epithelial cells. In this study, human lung epithelial cells (H1299 and A549) were exposed to different concentrations of road dust for 0, 6, 12, 24, 48 and 72 hours. As determined by MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) assay, the presence of road dust showed significant anti-proliferative activity against both cell lines. SDS-Page Western blot analysis was performed on proteins extracted from road dust exposed cells as well as cells grown under normal conditions (no road dust) and probed for phosphorylated c-Jun NH_2-terminal kinase (JNK). The cells expressed base levels of phosphorylated JNK in cells grown in the absence of road dust while cells exposed to road dust were found to have even higher levels of phosphorylated JNK suggesting that JNK phosphorylation is triggered by the presence of PGEs.

Sachindra Sanamvenkata
Mentor: Jason A. Rosenzweig
The Effect of Platinum Group Element-Exposure on Bacterial Growth

Understanding the influence of platinum group elements (PGEs) on gut bacterial flora may help provide insights into several human disease states. Since catalytic converters, which use heavy metals to filter vehicle exhaust were introduced nearly 40 years, PGEs are found in increasing quantities in nature. These PGEs enter the soil, the air, and eventually people's homes, yet not much is known about its effect on the human body and its flora. To create preliminary data on the effects of PGEs, gut flora *Escherichia coli*, *Pseudomonas aeruginosa*, and *Enterococcus faecalis* were grown in the presence of rhodium, palladium, and platinum in the form of standardized house dust. House dust concentrations of 100 µg/mL, 200 µg/mL, 500 µg/mL, and 1 mg/mL concentrations were prepared in both nutrient-rich environments (Brain Heart infusion) and nutrient-poor environments (Minimal Davis broth) in which bacterial cultures were grown. We observed that as the house dust concentration increased, growth of bacteria decreased. Surprisingly, however, *E. coli's* growth was enhanced in the presence of 200 µg/mL concentration of house dust in nutrient-poor environments. These results suggest that increasing PGEs in the environment will affect the biome of the human body, and perhaps decrease necessary probiotics.

Donyeil Hoy, Jay Saynonh, Laura Lay and Tan Nguyen
Mentor: Hyun-Min Hwang

Environmental Fate and Transport of Platinum in Houston, TX

Since the 1970s, platinum-group elements (PGEs) platinum, rhodium, and palladium have been used in catalytic converters to reduce unburned hydrocarbons, carbon monoxide, and oxides of nitrogen into less toxic pollutants. However, this has led to a substantial increase of PGEs in the environment. This research focuses on the environmental fate and transport of platinum (Pt) in Houston, Texas. Highway road dust and surface and core soil samples were acid digested and analyzed using inductively-coupled plasma mass spectrometer (ICP-MS). Platinum concentrations in ranged from 1.25 to 21.4 ng/g in surface soil, 18.2-149 ng/g in road dust samples, and 1.03-2.15 ng/g in core soil samples. In surface soil and road dust samples, Pt concentration increased with decreasing particle size. Road dust showed a significantly higher Pt concentration than surface soil, which may indicate a correlation between Pt contamination and proximity to highways. In core samples, Pt concentration decreased sharply within 5 cm and remained at background level below that layer. This is likely due to relatively recent contamination and organic rich top soil layer that behaved as a barrier for infiltration. Plant samples, which included *Helianthus annuus*, *Poa pratensis*, and *Cyperus esculentus*, were also analyzed to investigate the bioavailability of Pt. Platinum concentrations in plant tissues ranged from 6.82 to 11.5 ng/g, giving a bioconcentration factor (BCF) of 6.7 or lower. Atmospheric particulate matter (PM) deposition rates varied from 48.2 to 411 mg/m^2/day with no differences between weekdays and weekends, indicating that PM deposition rates were likely affected by local weather, not by traffic volume. PM_{10} concentrations ranged from 61. 6 to 104 $\mu g/m^3$ that are below National Ambient Air Quality Standard (150 $\mu g/m^3$) but exceed California EPA standard (50 $\mu g/m^3$), indicating that there may be health risks associated with atmospheric PM.

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