

Spring 2014, Vol. 50

# TRANSACTIONS

NATIONAL INSTITUTE OF SCIENCE



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Spring 2014, volume 50

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## **Acknowledgements**

*The National Institute of Science and Beta Kappa Chi Scientific Honor Society would like to thank the National Institute of General Medical Sciences, National Institutes of Health, for its continued financial support of students attending and of the mission and goals of the meeting.*

*Also, we thank AmPrint, LLC. for superb printing services of booklets and other items for the 70th Annual Joint Meeting of the BKX and NIS and Colella Photography for serving as the meeting's photographer.*

*The National Institute of Science, University of the District of Columbia and the Beta Kappa Chi Scientific Honor Society would like to take this opportunity to extend their sincere appreciation to the many volunteers whose time and efforts have contributed toward bringing the 70th Joint Annual Meeting to fruition.*

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### *From the Editor's desk.....*

The University of the District of Columbia (UDC) hosted the 70th Anniversary of the Joint Annual Meeting of the BKX/NIS in our nation's capital Washington, DC, from March 13-17, 2013. Two independent African-American scientific organizations, the Beta Kappa Chi Scientific Honor Society (BKX) and the National Institute of Science (NIS), met and decided to jointly provide a national scientific forum solely for African-American scientists and students to come together to exchange scientific information and present their research data at a time when they were excluded from most scientific organizations and meetings. For seven decades the mission of the Joint Meeting has remained steadfast in providing a forum for African American scientists and students to present their research and for 70 years it has provided a forum that exposes, engages, educates and nurtures future and developing minority scientists.. The meeting was superbly organized under the capable leadership of the Local Chair Freddie Dixon PhD (UDC) and the Conference Director Carolyn Cousin, PhD (UDC).

The meeting was held at the Hyatt Regency Reston, Reston, Virginia). The theme of the meeting was **"Bridging the Gap in STEM\* Research from Conception to Application"**. Many major scientific discoveries resulted from the need to ease human burdens that are manifested in forms such as diseases, catastrophic events in nature, and labor-intensive work, as well as to alleviate boredom or simply to satisfy a person's need for discovery. Our progress as a species is exemplary because we exploit what others have taught us or take advantage of information that became available through inquiry. The past year's meeting theme was a tribute to the intelligence, power and imagination of the human brain that has been instrumental in millions of discoveries and inventions without which, the world as we know it would cease exist. Our propensity for knowledge and discovery has had a great impact on our health and well being. The average life-expectancy of a human in the US is approximately 78 years and this is twice what it was a few centuries ago. Vaccines, pharmaceuticals, genetic medicine, cancer therapy, surgical innovations and better quality of healthcare are keeping us healthier, fitter and more productive. This status could not have

been achieved without the combined discoveries and inventions in all STEM disciplines! All of us can relate to a device that has dramatically changed our lives in the 21st century, the cell phone. The development of electronic computers in the 1950's, have now paved way for smart hand held devices, lap tops and high-throughput computing. The origins of the Internet reach back to research of the 1960s, commissioned by the United States government to build robust, and distributed computer networks. The world as we know now is wired for communication! Astronomy, technological inventions such as telescopes, spacecrafts, and satellites have paved way for space exploration. Air travel has become a necessity and so common place that we do not think of it as a work of science fiction! The idea that "we must bridge the gap" is a very powerful concept Whether you do it or someone else, if there is an idea, eventually there is an application and STEM disciplines are the paving stones towards this end .

The Opening Plenary Session started with a bang with the talk by Dr. Kanta Subbarao - Chief, Emerging Respiratory Viruses Section, Laboratory of Infectious Diseases, NIAID, NIH - whose research is focused on emerging and re-emerging viral diseases of global importance: pandemic influenza, severe acute respiratory syndrome (SARS) and dengue. (SARS) and dengue. This was followed by the Distinguished Lecture speaker Dr. Lawrence A. Tabak, Principal Deputy Director and Deputy of Ethic, NIH who have a wonderful talk about various funding opportunities and internships for minority institutions, faculty and students respectively. The Summa lecture focused mostly on Technology and was delivered by Mr. Jesse E. Russell, Chairman and CEO of incNETWORKS, and an engineer by training. He is also an internationally recognized Wireless Communications Consultant in the area of Advanced Broadband Wireless Technologies. He reiterated the importance of STEM disciplines in global progress and advancement. Dr. Kevin Gardner, Head and Senior Investigator, Transcription Regulation Section, Genetics Branch at the Center for Cancer Research, NCI, NIH delivered the NIS Memorial Lecture stating that "Modifying diet and maintaining a healthy diet, combined with developing pharmacological ways of lessening CtBP activity, may one day lead to a way to break the link between cancer and obesity. Research should continue to focus on the

link between obesity, C-terminal binding protein (CtBP) and breast cancer. This will require more population-based studies and multi-disciplinary teams of scientist to investigate these links". The BKX seminar was presided by Leonard L. Hayes III, PhD, Senior Director of Institutional Services for the office of Postsecondary Education and Former Executive Director of the White House Initiative on Historically Black Colleges and Universities (WHIHBCU).

The High School component was also a great success where a number of area schools participated in the poster competition with very high quality posters. Awards were presented by Mr. Joseph A. Isaac, Albert Einstein Distinguished Educator Fellow, at the National Science Foundation. Mr. Isaac shared his experiences as a teacher in the DC Public School System and his transition to National Science Foundation.

The meeting concluded with a gala at the Awards Banquet with an epic audio-visual tour of the two organizations the National Institute of Science and the Beta Kappa Chi Scientific Honor Society. The year 2013 commemorated the 70th anniversary of the Joint Annual Meeting of these 2 organizations which joined forces in 1943 to present a national forum for students and scientists of all ethnicities and various STEM fields to meet and share their scientific knowledge.

In lieu of workshops, there was a special event "See and Learn: Science in the Capital City" which included a driving-guided tour of Washington, DC and guided, educational tour of the National Museum of Natural History, US Botanic Gardens, Air and Space Museum and the Martin Luther King Jr. Memorial. Due to its popularity, we continued the "Evening Expo at the Marketplace" which was initiated at the 2010 Joint Annual Meeting for the first time. This is a venue where students have the opportunity to interact with exhibitors, counselors, and mentors who have the expertise to help outline the best plans for their academic future based on the students' academic credentials, career goals, and financial status. Students bring their business cards (provided by their sponsor and the NIS), career plans, hopes and dreams, as they enter the Marketplace.

This issue (Vol. 50, Spring 2014) will also include the highlights of all the above events, Speakers and their biographies, event photographs (due to budget restraints, all photographs are in B&W) and "Science

in the Capital City" information. The front cover is a graphic depiction of the STEM disciplines and the incredible human brain and thought processes that enable discoveries which makes possible mankind's eureka moments! The back cover of the Transactions shows the group photo of the meeting participants at the UDC campus. It will also include the AWARD WINNING ABSTRACTS from ALL oral and poster presentations including the High School component.

We also wish to acknowledge the efforts of those who contributed their time, resources and never ending supply of patience, in bringing this journal to fruition. We also owe a special thanks to our exceptional graphic artist and printer Mr. Alex Medley (AMPrint, LLC) who prints all the announcement, Transactions and program books for the meeting. We also wish to thank Colella Digital Inc. for serving as the meeting's photographer. If you have comments or suggestions regarding this journal or the meeting web site please contact the staff at:

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ccousin@udc.edu

\*STEM: Science, Technology, Mathematics and Engineering.

**National Institute of Science**  
(*www.nationalinstituteofscience.org*)

# TRANSACTIONS

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Nithya Raghavan, PhD

## EDITORIAL ASSISTANCE

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## THE NATIONAL INSTITUTE OF SCIENCE

Founded 1943

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P.O. Box 42673, Washington, DC 20015

March. 12, 2014

Dear Members:

I would like to take this opportunity to thank each and every one of you for entrusting me with the office of the President of the National Institute of Science for a second term. I can assure you that I will do everything in my power to uphold the standard of this great organization to the best of my ability. I would like to thank the past president and officers for a job well done and the newly elected officers for working with me this year.

While the past two years have been very exciting with excellent Joint Annual Meetings of the NIS and BKX, I also know the hard work that goes into planning a meeting of this kind. During my tenure, I have had the opportunity to work with Dr. Carolyn Cousin, Conference Director and other local Organizing Chairs in soliciting vendor participation for the meetings.

As your President, I have some new ideas regarding our organization that I would like to share. First of all, I am in the process of consolidating the past and present financial records in order to strengthen the financial pulse of this organization. Secondly, I am working on getting our organization recognized as a National Honor Society. In that regard, I have initiated communications with Dr. Dorothy I. Mitstifer at the Association of Colleges Honor Societies (ACHS). THE ACHS is dedicated to its mission to build a visibly cohesive community of national and international honor societies that promotes the values of higher education; fosters excellence in scholarship, leadership, service, and research; and adheres to the standards of honor society excellence. Not surprisingly, there is a lot of paper work that needs to be submitted, and I may contact some of you to get the relevant information required to complete the paperwork. Your cooperation, enthusiasm and energy will be a very valuable asset in this regard. The application is due by September 2014, and I am hoping to complete a majority of that task while we are at the 2014 Joint Annual Meeting of NIS and BKX at Houston, Texas which is being hosted by the Prairie View A&M University under the auspices of Dr. Laurette B. Foster.

These are just a few of the things that I would like to accomplish in the near future. Once again thank you for giving me the opportunity to work with you for two more years. If you have any ideas or suggestions, please feel free to contact me at 504-816-4725 or rbroadway@dillard.edu. Thank you and enjoy the meeting.

Respectfully submitted,

*Ruby Broadway*

Ruby Broadway, Ph.D.

*President, National Institute of Science*



**Kanta Subbarao, MD, MPH**  
 DChief, Emerging Respiratory Viruses Section  
 Laboratory of Infectious Diseases,  
 National Institute of Allergy and Infectious Diseases  
 National Institutes of Health, Bethesda, MD

# OPENING **PLENARY** SESSION

## Birds, Pigs and Bats: The global threat of emerging respiratory viruses

Influenza viruses and SARS-coronavirus (SARS-CoV) are examples of newly emerged global public health threats. Both are zoonotic infections but the viruses belong to separate virus families and they employ different strategies, such as mutation, deletion, recombination, and reassortment, to modify their genomes.

Aquatic birds represent the reservoir of influenza A viruses in nature. Viruses of all known (16 HA and 9 NA) subtypes have been isolated from waterfowl and shorebirds, while a limited number of HA and NA subtypes have caused infections in mammals including pigs, horses and humans. Antigenic shift is a rare but epidemiologically highly significant event in which a virus bearing a novel HA is introduced into the human population. A novel influenza virus has the potential to cause a pandemic if a large proportion of the population lacks immunity to the novel virus and if the virus has the ability to spread efficiently from person to person. In 2009, a novel swine influenza virus appeared and spread rapidly throughout the world in the first pandemic of this century. Highly pathogenic avian influenza A H5N1 viruses have been circulating in avian species since 1997 and have caused more than 600 human infections in 15 countries since 2003. Although the H5N1 viruses cause severe disease, they have not spread efficiently from person to person. Animal influenza viruses cannot be eliminated from their natural reservoirs but the impact of a pandemic can be mitigated by preparations to control its spread and vaccination is the key strategy to prevent severe illness and death from pandemic influenza.

The SARS-coronavirus is most closely related to a bat virus. Despite the lack of specific interventions, the

SARS outbreak in 2003 was brought under control with public health measures and excellent international cooperation and coordination.



*Dr. Kanta Subbarao is a physician with specialty training in pediatrics and infectious diseases. She has pursued a research career in the fields of molecular virology and vaccine development. Her contributions to microbiology are in vaccine development for emerging respiratory viruses. Her program has taken research from the bench to the bedside for SARS and pandemic influenza. Her unique contributions include live attenuated pandemic influenza vaccines and human monoclonal antibodies for the prevention and treatment of SARS and pandemic influenza. In 1997, her laboratory at the CDC played a key role in the characterization of a novel H5N1 avian influenza virus that was responsible for an outbreak in Hong Kong. This virus is now recognized as a progenitor of the current group of avian influenza A H5N1 viruses that are threatening another pandemic. Her laboratory, among others, identified molecular correlates of virulence and*



## | OPENING PLENARY SESSION

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*determinants of species specificity in the H5N1 viruses and applied reverse genetics techniques to generate candidate H5N1 vaccines. Dr. Subbarao's current research is focused on emerging and re-emerging viral diseases of global importance: pandemic influenza, severe acute respiratory syndrome (SARS) and dengue. Her laboratory made seminal contributions to the development of animal models and evaluation of vaccines against the SARS coronavirus.*

*Dr. Subbarao received her medical degree from the Christian Medical College, Vellore, University of Madras, India, and completed a residency in pediatrics at Cardinal Glennon Memorial Hospital for Children in St. Louis and a fellowship in pediatric infectious diseases and an MPH in epidemiology at the University of Oklahoma Health Sciences Center in Oklahoma City. After postdoctoral training in the Laboratory of Infectious Diseases, NIAID, she was on faculty at McGill University, Montreal, Canada, and then served as Chief of the Molecular Genetics Section of the Influenza Branch at the Centers for Disease Control and Prevention in Atlanta, Georgia. She joined the NIH as a Senior Investigator in 2002.*

*Dr. Subbarao is a Fellow of the American Academy of Microbiology, a member of the American Society of Microbiology, Pediatric Infectious Diseases Society, American Society for Virology, and Infectious Diseases Society of America. She is the ASV Medical Virology Councilor and is on the Editorial Board of PLoS Pathogens and the Journal of Virology. She has mentored graduate students, clinicians and post-doctoral fellows.*





**Lawrence A. Tabak, DDS, PhD**  
 DPrincipal Deputy Director and Deputy of Ethics  
 National Institutes of Health  
 Bethesda, Maryland

## DISTINGUISHED LECTURE

Dr. Tabak is the principal deputy director of the National Institutes of Health (NIH) and the deputy ethics counselor of the Agency. He previously served as the acting principal deputy director of NIH (2009), and prior to that as director of the National Institute of Dental and Craniofacial Research from 2000-10.

Dr. Tabak has provided leadership for several trans-NIH activities, including the NIH Roadmap effort to support team science, the NIH Director's initiative to enhance peer-review, and the NIH's implementation of the American Recovery and Reinvestment Act. Most recently, he co-chaired working groups of the Advisory Committee to the Director of NIH on the Diversity of the Biomedical Research Workforce and Information Technology and Informatics.

Dr. Tabak is an elected member the Institute of Medicine of the National Academies. He received his undergraduate degree from City College of New York, his D.D.S. from Columbia University, and a Ph.D. from the University of Buffalo.



Prior to joining NIH, Dr. Tabak was the senior associate dean for research and professor of dentistry and biochemistry & biophysics in the School of Medicine and Dentistry at the University of Rochester in New York. A former NIH MERIT recipient, Dr. Tabak's major research focus has been on the structure, biosynthesis and function of glycoproteins. He continues work in this area, maintaining an active research laboratory within the NIH intramural program, in addition to his administrative duties.



**Jesse E. Russell**

Chairman and CEO, incNETWORKS, Inc.

## SUMMA LECTURE

Mr. Russell is currently Chairman and CEO of incNETWORKS a Broadband Wireless Communications Company focus on 4th Generation Wireless Communications Networks and Technologies. Mr. Russell has over thirty years of professional experience in directing Research and Development of pioneering technologies, products and services related to the communications industry with Lucent Bell Labs, AT&T and incNETWORKS. For the last twenty years, Mr. Russell's work has been focused in the wireless communications area as the Chief Technical Officer for Lucent Wireless Business Unit and Chief Wireless Architect and VP of Advanced Communications Technologies with the AT&T Company. Mr. Russell has over a decade of experience with business development aspects of communications technologies, products and service realization through business strategy development, business case preparation, marketing and sales support as well as Customer Interface and Product Portfolio Management. Mr. Russell is a Member of the National Academy of Engineering, a Fellow of the IEEE, and a Fellow of the International Engineering Consortium (IEC). In 1980, Mr. Russell was selected by Eta Kappa Nu as "The Most Outstanding Young Electrical Engineer of the Year" under the age of 32. Mr. Russell has over 75 U. S. Patents to his credit in the Communication Engineering field.



Mr. Russell has also served for over 14 years as Chairman of the Telecommunication Industry Association (TIA) Wireless Communication Standards Organization. As a recognized communications technology expert, Mr. Russell testified before a Congressional Subcommittee on Technology, as well as appearing before Judge Green during the divestiture hearings on the breakup of the Bell System. Mr. Russell is also an internationally recognized Wireless Communications Consultant in the area of Advanced Broadband Wireless Technologies and emerging broadband wireless 3G and 4G product strategy, as well as a consultant in regulatory and spectrum strategy. In addition, Mr. Russell consults on wireless standards related issues such as RF health and safety matters as well as Cellular Communication Industry Standards (1G, 2G, 2.5G, 3G "UMTS", and 4G).

Mr. Russell received his Bachelor of Science Degree in Electrical Engineering from Tennessee State University in 1972 and his Masters Degree in Electrical Engineering from Stanford University in 1973.



**Kevin Gardner, MD, PhD**

Head, and Senior Investigator,  
Transcription Regulation Section, Genetics Branch  
Center for Cancer Research  
National Cancer Institute  
National Institutes of Health, Bethesda, MD

## NIS MEMORIAL LECTURE

As senior investigator and head of the Transcription Regulation Section, Genetics Branch, Dr. Gardner has devoted his tenure at NIH to understanding the cellular and molecular biology of gene regulation and, developing strategies to define pathways and mechanisms of transcriptional control in cancers of lymphoid and epithelial origin. Currently his focus is on applying translational applications to understanding, diagnosing and treating malignancies in humans, specifically: 1) The Mechanism of Transcriptional Control by p300-ELL complexes and 2.) Transcriptional regulation by BRCA1-associated co-regulator complexes.

His laboratory studies chromatin-based mechanisms of transcriptional control and how environmental factors (intrinsic and extrinsic) triggers these mechanisms to regulate gene expression programs to respond in specific ways during health and disease states. Most recently his research has focused on the gene regulatory processes that are involved in the evolution of leukemia and in the initiation and progression of breast cancer tumors. He and his fellow laboratory researchers have assembled a research program that incorporates principals of molecular, biochemical, and cell biological methodology with computer technology; specifically, genome-wide bioinformatics and computational technology, to assemble a research portfolio that incorporates multi-disciplinary translational applications to define molecular links between race, lifestyle, the environment, and disease.

Dr. Gardner and colleagues at the National Cancer Institute published a paper last month in the journal *Nature* Communication further indicating that breast cancer carrying too much body weight are linked. Their studies showed that high carbohydrate consumption (high carbohydrate diet) causes a particular protein to go in overdrive. The protein is called C-terminal binding protein (CtBP) and it emerges when normal metabolic function becomes disrupted or 'gets out of whack'. The researchers found that the higher the levels of CtBP detected, the more aggressive the cancer and the shorter the survival rate of the patient. This link also partially explains why women who carry the BRCA1 gene (hereditary mutation) also have increased breast cancer risks if they gain weight. This highly suggests that a high carbohydrate diet modi-

fies the activity of the BRCA1 gene: Mutations to the BRCA1 and BRCA2 genes have previously been linked to increased risk of breast cancer. The findings of the Gardner group may have implications to the general population that inducing this exaggerated protein activity (CtBP) through choosing to eat a diet high in carbohydrates may put you more at risk for breast cancer. Just as the research team found that high levels of carbohydrate increased tumor growth, low levels of protein stabilized tumor growth.

Dr. Gardner's laboratory's research findings strongly suggest that targeting CtBP may provide a method of treating and possibly preventing breast cancer. Dr. Gardner himself has made statements to this effect. "Modifying diet and maintaining a healthy diet, combined with developing pharmacological ways of lessening CtBP activity, may one day lead to a way to break the link between cancer and obesity"...."Research should continue to focus on the link between obesity, CtBP and breast cancer. This will require more population-based studies and multi-disciplinary teams of scientist to investigate these links."

*After receiving his B.S. from Yale University, Kevin Gardner matriculated to the Johns Hopkins University School of Medicine. In addition to the rigorous medical program, he studied the regulation of membrane skeletal proteins in the Department of Cellular Biology and Anatomy. Upon completion of the programs at Johns Hopkins, he earned a MD and PhD. Dr. Gardner went on to complete his residency training in anatomic pathology at the National Cancer Institute and became board certified in Anatomic Pathology. Dr. Gardner research as generated has many publications and he, himself, a member of the editorial boards of the American Journal of Pathology the International Journal of Medical Sciences, the Open Clinical Chemistry Journal and the American Journal of Translational Research. An outstanding researcher, he is an elected member of the American Society for Clinical Investigation. Dr. Kevin Gardner's work and leadership has been recognized and applauded by the National Institutes of Health by awarding him the NIH Director's Award in 2007 and again in 2011.*



### **Leonard L. Haynes III, PhD**

Senior Director of Institutional Services for the Office for Postsecondary Education  
Former Executive Director of the White House Initiative on Historically Black Colleges and Universities (WHIHBCU)

## **BKX** LECTURE

As Director of Institutional Services for the Office for Postsecondary Education, Dr. Haynes administers the implementation of programs authorized by the Higher Education Reauthorization Act impacting higher education development. These programs include Title III of Historically Black Colleges, Hispanic Serving Institutions and the Fund for the Improvement of Postsecondary Education (FIPSE). The budget for the new Institutional Services area is approximately \$700 million.

Prior to this appointment, Dr. Haynes was appointed by then Secretary of the U.S. Department Education, Margaret Spellings, to serve as Executive Director of the White House Initiative on Historically Black Colleges and Universities (WHIHBCU). Dr. Haynes was responsible for implementing Executive Order 13256: to staff the President's Board of Advisors (George W. Bush administration) on HBCUs and to ensure the implementation of the objectives of the presidential executive order that establishes the initiative. In this realm he advised the president, his advisors and the US Secretary of Education on how to best support, fund and strengthen HBCUs.

Dr. Haynes came to this appointment from an outstanding and influential career a tenured educator and established public servant. He was a faculty member at Southern University, Howard University and George Washington University where he taught history and public policy. On the administrative side of academia, Dr. Haynes has served as senior assistant to the president of American University, acting president of Grambling University, and executive vice president of the Southern University System. As a public servant, he has held positions as director of the Fund for the Improvement of Postsecondary Education (FIPSE) in the Department of Education's Office of Postsecondary Education, assistant secretary for postsecondary education, director of academic programs at the United States Information Agency (USIA), and director of the Office for the Ad-

vancement of Public Black Colleges, the agency which represents publically supported HBCUs in the U.S.

Dr. Haynes has witnessed and studied the impacts of desegregation on public higher education and particularly its impacts to on public black colleges. Publishing his findings on the subject of equity and parity for minority populations and their education, he is regarded as an expert on this matter and is as sought after in the lecture hall as in the media (radio and television) to commemorate on education and related topics. He has been solicited as an evaluator for government and regional accreditation bodies. Haynes as served as consultant to post secondary institutions and provided technical assistance for many non-profit groups and private sector organizations such as: the Brookings Institution, the Education Commission of the States, the Embassy of Canada, the Ford and Southern Education foundations, to name a few.



Before long, Dr. Haynes' expertise had extended beyond these shores as he made important contributions to advancing the cause of international higher education by serving as consultant to international postsecondary institutions and furthering the public diplomacy efforts of the United States. He led the U.S American Talks on Higher Education Cooperation involving Canada, Mexico, and the U.S., held at the Johnson Foun-

dition in Wisconsin, in 1992. This meeting resulted in the creation of the Program for North American Mobility in Higher Education; served as a principal member of the United States Delegation to the 50th Anniversary AMIDEAST Conference in 2002 in Marrakech, Morocco; and served as a member of the United States Observer Delegation to the UNESCO World Conference on Higher Education in 2003. During his appointment as assistant secretary for postsecondary education, Dr. Haynes was instrumental in establishing the 'EU-U.S. Atlantis Program; the academic mobility program between the U.S. and the European Community, which creates international dual degrees in higher education.

As a reflection of this distinguished career in advancing the cause of education and the common good for all, he has been the recipient of many honors, accolades and awards. He was a principal at the former Council for Excellence in Government. In May 2006, he was recognized by the John Glenn School of Public Affairs and Management of the Ohio State University as the 16th recipient of the school's Excellence in Public Service Award and has been recognized as a distinguished alumnus of Southern University. Haynes has been bestowed with 12 honorary degrees, including one from his alumnus, Ohio State University.

An accomplished speaker and presenter, Haynes has served as a commencement speaker and given countless keynotes in the U.S. and abroad. Haynes is a member of many societies, boards, commissions, and civic, social, and professional organizations, including, History Makers, Who's Who in America, Who's Who in Black America, Rotary International of Washington D.C., Phi Delta Kappa, Sigma Pi Phi Fraternity, and the Omega Psi Phi Fraternity. He is a member of Asbury

United Methodist Church in Washington, D.C. , where he resides, and a career member of the Senior Executive Service for the United States and also Haynes earned a B.S. in history from Southern University, a M.A. degree in American history from Carnegie-Mellon University, and a PhD in higher education administration from the Ohio State University. A native of Boston, Massachusetts, he and his wife, Mary, resides in the Washington, DC metropolitan area. They are the proud parents of four children and four grandchildren.



# AWARDS BANQUET PROGRAM

March 16, 2013  
7:30 PM – 10:00 PM - Grand Ballroom

**Frederick McLaughlin, EdD, Presiding**  
President, Beta Kappa Chi Scientific Honor Society (BKX)  
Member, NIS  
Fort Valley State University

**Opening Remarks**

**Frederick McLaughlin, EdD**

**Greetings**

**Ruby Broadway, PhD**  
President, National Institute of Science (NIS)  
Member, BKX  
Dillard University

**Music**

**Jazzy Blue**

**Invocation**

**Valerie Holmes, DMin**  
Jubilee Congregational United Church of Christ

**Reflections**

## **DINNER**

**Carolyn Cousin, PhD**  
Conference Director  
Past President and Past Exec. Sec., NIS  
Member, BKX  
University of the District of Columbia

**Freddie M. Dixon, PhD**  
Local Chair, 70th Joint Annual Meeting  
Eastern Regional Director, NIS  
University of the District of Columbia

## **PRESENTATIONS**

**Recognition of Awardees**

**Deadra James Mackie, MS**  
Executive Secretary, BKX  
Member, NIS  
Southern University & A&M College

**Fenwick-Wooten, BA**  
Executive Secretary, NIS  
University of the District of Columbia

**Special Awards**

**Carolyn Cousin, PhD**

**Announcements & Final Remarks**

**Frederick McLaughlin, EdD**

**INDUCTION OF NEW BKX & NIS OFFICERS**

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## A HISTORY

# THE NATIONAL INSTITUTE OF SCIENCE (1943-1993)

Shelbert Smith, Ph.D.

*“God put a dream like steel in my soul,  
Now, through my children, I’m reaching the goal”  
Langston Hughes*

In 1943, Dr. Hubert B. Crouch, Professor of Biology, Kentucky State College enlisted the support of a fellow scientist, Dr. Thomas W. Turner to organize a group of scientists and formed the National Association of Science Teachers in Negro Schools. This organization, established to promote the professional growth of black scientists, became the predecessor of the National Institute of Science (NIS).

During the years immediately preceding 1943, the country was involved in a manpower war mobilization effort, and in the development of its scientific research for the military purposes in World War II. But, the doctrine of separate but equal was a widely accepted practice and blacks continued to be excluded from the mainstream of American life. However, it must be noted that during the war effort and despite discriminatory practices in society, many black scientists played significant roles in such major governmental scientific research programs as the Manhattan Project, the University of Chicago Metals Laboratory, the Synthetic Rubber Program, the Radar/Microwave Program, the Synthetic Fuels Program and the American Red Cross (Blood Donor Project. It must be noted that, in general, black scientists did not have a significant role in most private scientific research activities. The scientific effort during the war was not without direct consequences on our society. The results of these major scientific efforts led to the post war development and peace time uses of miniaturization, transistors, radar, atomic energy, synthetic rubber, new drugs, blood plasma, synthetic plastics, and other technologies which subsequently brought significant changes in the standard of living in our society. In the period following the end of World War II, the country was enamored with science and its accomplishments and nearly everyone looked to science to bring about a better society in the post-war period. In spite of these scientific achievements, and of the significant participation of some blacks in these achievements, as well as the national unity that the war effort spawned, the walls of discrimination still tightly encircled the lives of most blacks and the black educational institutions. It was with this background of national unity, an improved economy, success in scientific achievements and the continued exclusion of blacks from the scientific community that nurtured the idea of uniting the black scientists into an effective organization to address the needs of the black scientist. These two scientists, Drs. Crouch and Turner, as well as others, expected that the development of the capabilities of the black scientists in an organized manner could be realized more fully for a larger role in building a postwar technological society, and in removing the walls of discrimination that prevented the full participation of blacks in society. Dr. Crouch and Dr. Turner and their colleagues firmly believed that the scientific capability that resided in the historically black institutions could be channeled to advance the fortune of the black scientists and to improve human pursuits, particularly for all blacks.

Dr. Crouch and Dr. Turner, as teachers and researchers, also recognized that the black scientists and the historically black institutions had many concerns and problems in common. They believed that the total scientific and intellectual capability of the historically black colleges and universities should be harnessed to address these common problems and improve the science training and research at all of the historically black colleges, and improve the plight of blacks in society. In fact, many black scientists and other educational leaders also realized the need to solve problems that were indigenous to the black colleges and universities and the black community.



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In the summer of 1939, Dr. Crouch made a biological specimen collection trip along the East Coast and proposed the idea of a national science organization to many fellow scientists who endorsed enthusiastically the notion of a national organization of black scientists. During this trip Dr. Crouch initiated a close and enduring friendship with Dr. Thomas W. Turner, Chairman of the Biology Department at Hampton Institute. Like Dr. Crouch, Dr. Turner shared the same concern and ideas about the role of the black scientists in improving educational programs and enhancing of the status of the historically black colleges in the post-war period. It was through these productive and stimulating discussions of Dr. Crouch and Dr. Turner that the notion of a national organization of black scientists was nurtured and expanded. While at Hampton Institute, Dr. Crouch learned about the activities and programs of the Virginia Conference of Science Teachers which had been in existence for ten years, and of which Dr. Turner had been a founding father. Although the Virginia Conference had been formed as an organization of black scientists and science teachers, the black scientists in Virginia also had been freely accepted into the Virginia Academy of Science, but had little input in the policies and selection of officers of the Academy. At about this same time, the Virginia Conference was considering the expansion and formation of a tri-state (VA, NC, WV) organization to address the concerns of the blacks in science. The objective of the plan was to enable a group of colleges in close proximity to work together to achieve their specific objectives, and to effectively address the problems of the black teacher and scientist. The plan was slow in developing because some members of the Conference were fearful and uncertain of the role that the Virginia Conference would play in a regional organization, and because some members felt that the well organized, effective program of the Virginia Conference might be jeopardized in a larger, diverse and less organized regional group.

Upon his return to Kentucky State College after the summer of 1939, Dr. Crouch continued to search for a mechanism by which the Virginia Conference could serve as a nucleus for the formation of a national organization. In a letter to Dr. Turner, Dr. Crouch stated the specific objectives he thought such an organization should have; and he identified the mechanism by which this organization could be affected. He believed the major objective should be “the promotion of science in the interest of more equitable integration of Negroes into American life”. He suggested further that the objectives could be achieved by stimulating scientific research in the colleges, utilization of research for black entrepreneurship, encouragement of scholarship among science teachers, encouraging more joint research between college science teachers, requesting grants from industrial firms to support research activities, and encouragement of science teachers to actively participate in national science organizations. Another objective included the organization of a body of black scientists to make recommendations on problems related to science and education for blacks. Over a period of a few months, Dr. Turner and Dr. Crouch exchanged several letters which focused on the possible objectives of such an organization. The detailed outline of objectives which Dr. Crouch proposed later became the focus of discussion and the specific objectives for the national science organization.

In March 1940, at the invitation of Dr. Turner and the Virginia Conference, Dr. Crouch presented his plan to the Virginia Conference of Science Teachers for the formation of a regional organization with the Virginia Conference serving as the nucleus. In addition, Dr. Crouch proposed the formation of a Marine Biological Laboratory and a biological supply house to be established in Virginia to serve the needs of all black scientists. Although this regional concept did not develop further, the attempt to organize the black scientists on a regional basis had stimulated considerable thought and discussion among many black scientists about the need for such an organization on a national level. At the same time, the various state science groups within the state educational associations continued to grow and extend their influence. By 1943, several state educational organizations actively sought to unite formally the black scientists within their state. In addition to the Virginia Conference, similar organizations in Texas, Tennessee, North Carolina, Alabama, and Kentucky had been formed and were developing effective programs for the black scientists. These state teachers’ associations began to include on their agenda sessions about the mutual concerns of the

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historically black colleges and universities, as well as the secondary schools, and the need to address the problems nationally. Thus, the concept of a national science organization had generated a great deal of interest, and Drs. Crouch and Turner proceeded to solicit the support of all black scientists, as well as other interested persons and organizations. In the meantime, the country had stepped up its war effort and its reliance on the scientific manpower of the country. These wartime scientific activities more sharply focused on the professional capabilities and needs of the black scientists, and on the status of science education at the historically black colleges and universities.

During the 1942-1943 academic year, Dr. Turner had been granted a year's leave of absence from his academic duties to conduct a study of science education at the black colleges and universities. He visited a large number of black colleges and several white colleges in the southern states and made an intensive study of the capabilities and needs of the black colleges. Although this study, "A Study of Science Education in the Negro Colleges", was devoted primarily to the academic and administrative aspects of science education, the study revealed the need for better facilities which reflected on the science education programs at the black colleges. The collected data from this study provided a very valuable resource for making an accurate assessment of the science education practices, as well as the general educational needs in the historically black colleges. This report prepared by Dr. Turner later became the framework for the articulation of the objectives of the national organization.

Early in 1943, the Association of Colleges and Secondary Schools for Negroes, headquartered at Atlanta University, initiated a study of science education in the schools of the Southeast region of the country. This study was supported by the Bureau of Educational Research in Science at Teachers College, Columbia University, and by several scholarship grants from the General Education Board. The study, "The Southern Regional Study in Science", focused on the analysis of the socioeconomic, cultural and intergroup problems of the Southern region, and on the maximum use of the natural and human resources for better living within the area. It was that part of this study that was related to science and science education that was of concern to Dr. Crouch and Dr. Turner. As an aftermath of World War II and the success of science achievements in the war effort, many states recognized that the status of science education in the schools must be reviewed and improved if the schools were to supply the needed competent scientists for the future. The study included a review of the science training of elementary and secondary school teachers by the colleges and universities, but also the science education at the college level. This was a very comprehensive study, and resulted in greater cooperation among the southern states to improve science education at all educational levels. The study exposed the problems and the effective programs that were occurring in many science education programs. This study resulted in the initiation of many summer science programs at colleges and universities throughout the southern states. These summer science programs were designed for the secondary school teachers, and to help the teachers to improve their skills and enhance the science teaching in the schools. These summer science programs were very effective and were continued for many years in all parts of the country. While the study initially centered on schools in the Southeast, it was expanded through support from other private cooperating agencies to include all schools in the South. Some of the college science teachers who participated in the study and in the preparation of the report were James H. Birnie, South Carolina State College; James W. Hazard, Southern University; Samuel M. Nabrit, Atlanta University; and Hubert B. Crouch, Kentucky State College. During this same period of time, a great deal of interest and planning had occurred at several historically black colleges for the establishment of biological research laboratories and stations. The purpose of these laboratories was to provide a place and resources for the black scientists to study and to do research in an environment which would enhance the science capabilities of the researchers, to provide for an exchange of ideas, and to provide for the development of cooperative research among the black scientists. The more highly developed plans for these laboratories which had received attention were the Hampton Institute Plan, the Fort Valley State College Plan, the Tuskegee Institute Plan, and the South Carolina State College Plan. Each of these plans was similar in structure

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and objectives. Each was designed to provide an environment where a group of black scientists could spend time together on research and share ideas about educational activities. It was determined that the various schools and participants with grants would support the laboratory after initial funding 'was achieved. These laboratories were similar in structure and purpose as such national laboratories as Woods Hole Institute in Massachusetts and the Scripps Oceanographic Institute in California. Although none of these plans became a reality, they did stimulate considerable discussion as a means for enhancing the scientific capability and training of black scientists, and demonstrated the visions and ideas that black scientists had developed.

The information derived from these science educational studies and the interest shown by the black scientists in addressing their professional and educational needs further stimulated Drs. Crouch and Turner to pursue a mechanism to unite the black scientists to attack the common problems through an organized effort. Early in the planning stage, they recognized that any national organization had a greater chance of success if the support of the historically black college presidents could be obtained. Dr. Crouch and Dr. Turner enlisted the support of Conference of Presidents of Negro Land Grant Colleges. The Conference of Presidents of Negro Land Grant Colleges was a well organized group of historically black college administrators. This organization of black college presidents was created in 1913 to address the common problems of their institutions and to seek unity in achieving the common goals of these institutions. The group had been very effective in providing a communications network among blacks in higher education and through cooperation had addressed the various educational problems confronting the black community. Drs. Crouch and Turner accepted an invitation to make a presentation on the status of science education at the 21 ST Annual Meeting of the Conference of Presidents of Negro Land Grant Colleges. The invitation was extended by Dr. G. L. Harrison, President of Langston University and then President of the Conference. The meeting was held in Chicago, Illinois at the YMCA, 3763 South Wabash Avenue on October 26-28, 1943. Dr. Crouch and Dr. Turner were urged to bring scientists from several different institutions representing all disciplines. A purpose of the meeting was to stimulate more interest in science education and the need to improve science education in the Historically Black Colleges and to make institutional science programs more functional in the community. Among the presidents who had an active role in arranging this meeting and agenda with the scientists were: President R. B. Atwood, Kentucky State College; President H. M. Bond, Fort Valley State College; and President H. D. Gregg, Delaware State College.

There were ten science teachers in attendance at this meeting who represented Langston University, Lincoln University(MO), Southern University, Fort Valley State College, Atlanta University, Howard University, Hampton Institute, and Kentucky State College. The science teacher participants in this meeting were those who had been or were part of significant cooperative science movements in the historically black schools. As part of the preplanning for this meeting, the scientists prepared three papers on the status of science education in the historically black institutions for presentation. These papers were: "Science Education in Negro Colleges" by Dr. Turner; "A Proposed Marine Biological Laboratory" by Mr. James H. Birnie, South Carolina Agriculture and Mechanical College; and "A Summary of the Southern Group Research Study on Educational Problems in Science" by Dr. Samuel M. Nabrit, Atlanta University. These papers were adapted from the full and comprehensive reports of Dr. Turner and Dr. Nabrit mentioned previously. The paper of Dr. Brinie was the result of the study of the several proposed biological stations that had been developed. These presentations provided a very clear picture of the problems and needs of science education in the historically black colleges, and the presidents were extremely receptive to ideas and suggestions that were presented. After several working sessions of the presidents and science teachers, it became evident that the major problems in the various schools were very similar if not the same. Thus, it was necessary to define and consolidate some of the major science related concerns and to plan a course of action to improve science education at the historically black schools. The major problem areas identified by the presidents and scientists were: (I)

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adjustment of college science teaching to trends in modern science development; (2) provision for the upgrading of scholarly production among science teachers; (3) development of proper relationships in school science on all levels of training; (4) deliberated adaptation of college science to community service outside purely academic areas; (5) development of sympathetic understanding of science values in college education and (6) the need to improve facilities and resources for teaching and research. In addition to these major presentations to the presidents, the scientists themselves met as a group and later with the Executive Committee of the Conference of Presidents of Negro Land Grant Colleges to develop strategies for implementing the recommendations of the Southern Science Study Group, and to discuss local problems and needs in science education relative to any post-war planning that they could address cooperatively. The group recognized that any course of action to improve science teaching and academics in general would ultimately require courageous departure from many wide-spread practices and philosophies which had been accepted with passivity. In order to overcome these past practices, programs and projects must be developed through the coordination of college and community resources, both within and without the science field. The presidents endorsed the recommendations of the Southern School Science Study Group presented by Dr. Turner, and pledged their support of its initiatives and planned programs. It was suggested that the continuation of this study should encompass all the historically black schools in its attack on the problems of science education for blacks. The Presidents also endorsed the Fort Valley State College Plan for establishment of a research laboratory and station in the biological sciences at Camp John Hope near Fort Valley State College. It was anticipated that the station would be supported by a grant from the General Education Board and from funds from the cooperating institutions. The research station would utilize the necessary facilities of Fort Valley State College, and would be designed to provide a research laboratory and study area for the scientists of the historically black colleges, and would provide an opportunity for scientists to share in cooperative research.

However, the most significant part of the meeting was the decision of this group to organize the scientists on a national basis to carry out the recommendations of the Southern Secondary School Study Group. The original plan of this meeting with the presidents did not include any thought of organization, but only an opportunity to discuss the concerns and needs of the science teachers in the historically black colleges. Thus, the organization of a national science group was initiated without prior formal planning, but with the enthusiastic support and endorsement of the college presidents as well as the scientists. During this meeting, the scientists decided to organize into a corporate body, the National Association of Science Teachers in Negro Colleges. Thus, the many years of discussion and planning to fulfill the growing professional needs of the scientists in the historically black colleges, on a national level, culminated in this organizational step. The organization was to be designed "to meet the needs of Negro science teachers and to coordinate the attack on the professional, economic and intercultural problems peculiar to the Negro group in American life". At this meeting, the structure, the membership and officers of the organization were formulated, and an executive committee was assigned the task of developing a constitution.

The gathered scientists believed that it was necessary to convince other scientists of a need for such an organization to address the problems confronting the black colleges, and the need of an organized effort to resolve the problems. Cognizant of the indifference that might be shown by some black scientists to such an organization, the group felt the necessity to emphasize and publicize the following understandings: (a) that the major problems of blacks are unique because of discriminatory practices in our democracy; (b) that the achievement of true democracy will depend heavily on the united efforts of black leadership; (c) that science in the historically black schools could and should render far greater services in helping to solve many of the pressing practical problems of the race; and (d) that the Association was in no way a substitute or a competing organization. The organization was to focus on the relentless search for avenues through science to improve the standards of American life in general, by seeking to remove all conditions which encourage deprivations and inequalities of opportunity. The group also indicated that

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although it was organized by black scientists it steadfastly maintained that just as there is no black science, neither should there be an expressed or implied restriction of membership to scientists who are black.

In order to provide guidelines and objectives for uniting all of the scientists at the historically black colleges, the organizing group prepared a set of recommendations for the proposed organization. This first official document that was developed and accepted by the group as a working guideline was as follows:

### **RECOMMENDATIONS OF THE SCIENCE GROUP**

1. To endorse and aid in the sponsorship of an organization of science teachers in Negro colleges and other schools. The proposed organization shall be "The Association of Science Teachers in Negro Colleges and Affiliated Institutions".

The organization will have the following general objectives:

- a. To stimulate interest in the field of science, and to improve the teaching of science in the institution.
  - b. To make science more functional in general instruction, experimentation, and in the service programs of the institution.
  - c. To make institutional science more functional in the community.
  - d. To unify organization and individual efforts in the sciences.
2. That the Executive Committee authorize a sub-committee on science problems to confer with the science group regarding the implementation of its programs in Land Grant Colleges.
  3. That the initial meeting of this sub-committee with the science group be held during the current sessions of the Land Grant Conference.

This first official document of recommendations was signed by those scientists in attendance at the meeting. They were: Thomas W. Turner (Hampton Institute), Chairman; Eugene D. Raines (Kentucky State College), Secretary; Booker T. Griffith (Fort Valley State College); Rufus P. Perry (Langston University); Samuel M. Nabrit (Atlanta University); Eldridge A. Miller (Langston University); William W. Dowdy (Lincoln University-MO); James W. Hazzard (Southern University); Hubert B. Crouch (Kentucky State College); and Herman R. Branson (Howard University). The agenda and the events of the meeting were far more rewarding than had been anticipated by the organizers. Thus, this meeting ended with a significant accomplishment and with great enthusiasm for the future of organizing the black scientists on a national level. Indeed, it was a momentous occasion for those who had dreamed, planned and struggled so long for unity among the black scientists and for an organization to address the concerns of the scientists at the historically black colleges. At this first meeting, the following officers were elected to carry on the work of strengthening and publicizing the efforts of the fledgling organization: President, Dr. Thomas W. Turner; Vice President, Dr. Samuel M. Nabrit; Executive Secretary, Dr. Hubert B. Crouch; Regional Directors, East (VA, DC, PA, MD, DE, NC), Dr. John M. Hunter (Virginia State College; Southwest (MO, AR, OK, TX), Mr. Rufus P. Perry; Midwestern (OH, WV, KY, TN), Dr. Eugene D. Raines; Southeast (SC, GA, FL), Dr. Booker T. Griffith; Midsouth (MS, AL, LA), Dr. James W. Hazzard; and the Executive Committee which consisted of the above officers and Mr. James H. Birnie, South Carolina State College and Dr. Herman R. Branson, Howard University. As this historical meeting closed, the Conference of Presidents of the Negro Land Grant Colleges authorized the formation of a standing committee on science problems to work with the scientists to implement their programs. The proceedings of this historical meeting were published in the Proceedings of the Conference of Presidents of Negro Land Grant Colleges, which was the official publication of the Conference of Presidents of Land Grant Colleges. This newly formed

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National Association of Science Teachers in Negro Colleges was now a reality, and its founders moved quickly to plan for the First Annual Meeting that was scheduled to be held at Fort Valley State College and Camp John Hope in April 1944.

During the months following the historical meeting in Chicago, the organization and the officers made plans for the First Annual Meeting of the National Association of Science Teachers in Negro Colleges held at Fort Valley State College and Camp John Hope, May 12-13, 1944. During the year, start-up funding had been received for the Camp John Hope station from the General Education Board. The meeting had been well planned and organized by Dr. Hunter of Virginia State College, contributed to the success of this first program. There were 36 members attending this meeting representing 21 colleges and two high schools. Although the attendance at this meeting seemed small, the accomplishments of this dedicated group of scientists were significant. In addition to the business sessions, seven papers were presented that were related to science education and research at the historically black colleges. These papers were:

1. Further Implications of the Southern Regional Study in Science  
S. M. Nabrit, Atlanta University
2. Vocational Guidance Programs in Science in Negro Colleges  
E. D. Raines, Kentucky State College
3. The Research Station in the Biological Sciences at Fort Valley  
B. T. Griffith, Fort Valley State College
4. Outlooks for a Marine Division of the  
Research Station in the Biological Sciences  
J. H. Birnie, South Carolina State College
5. Opportunities for Professional and Industrial Research in Negro Colleges  
H. R. Branson, Howard University
6. Bringing Together the Secondary College Science Programs  
W. H. Brown, Secondary School Study Program, Atlanta University

School and

7. Workshop Programs for Improving Science Instructions  
H. V. Eagleson, Morehouse and Clark Colleges

This meeting ended with renewed interest in the potential for the organization to impact positively on science education at historically black colleges. The importance of post-war planning for science education was the rallying point of this group, for it was recognized that the results of the research in support of the war effort could affect the education and research in all colleges and universities. Moreover, the members anticipated that the aftermath of the war effort would bring a marked change in race relations and education. The members also discussed plans to seek surplus equipment after the war to supplement and support the resources at the historically black colleges. Two very significant actions adopted at this meeting were the name change of the organization to the National Insti-

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tute of Science, and the expansion of the objectives of the meetings to include the opportunity to present research papers at each Annual Meeting. In addition, the group initiated a program extension of the Southern Regional Study in Science and the Study of Science Education in Negro Colleges. The members developed a program for the cooperative scholarly production in science, and a program of vocational guidance for college students and graduates. This meeting also included a plan to develop a roster of all black scientists and their works. Dr. Horace Mann Bond and Dr. Thomas W. Turner were principal speakers at the meeting. Dr. John M. Hunter of Virginia State College was one of the early leaders in developing the concept of a black science group, and he had a great impact on the recruitment of black science teachers among the schools on the Eastern coast. He had worked closely with Dr. Crouch and Dr. Turner in formulating the concepts and objectives of the group. In recognition for his work with the organization, Dr. Hunter was elected the second President of the organization. Other officers elected were Dr. Samuel Nabrit, Vice President, and Dr. Hubert B. Crouch, Executive Secretary.

The Second Annual Meeting was hosted by Livingstone College on May 4-5, 1945. Attendance increased to fifty-six members and eighteen scientific papers were presented. Twenty-four colleges and four high schools were represented among the attendees. At this meeting, the organization approved the formation of Sections reflecting the various science disciplines for the presentation of papers and discussions. The members also developed guidelines for the selection and presentation of an Annual Honor Paper at each meeting. Each section was permitted to nominate an outstanding scientist in their discipline to give an Honor Paper. An Executive Committee was selected the Honor Paper awardee from the nominations of the sections. Each year, an Honor Paper would be given in one of the disciplines of the sciences. This activity was designed to give proper recognition to an outstanding scientist for their achievements, as well as to demonstrate the quality of research performed by black scientists and to stimulate interest in research and in the organization. In addition, the members adopted a resolution to make the Morehouse Journal of Science the official journal for publication of the proceedings of the National Institute of Science. The membership established an annual dues of \$3.00 which included a subscription to the Morehouse Journal of Science. The meeting included a detailed and comprehensive report of the science education committee and the Southern Science Study Group. Dr. S. R. Powers of Columbia University, who had been supportive and an advisor of the Southern Science Study, gave the address at the annual banquet on "Education in Science for Useful Living".

The Third Annual Meeting was held May 1-3, 1946 at Tennessee A and I College. It was the first meeting that extended over a three day period. By the time of this meeting, the organization had been strengthened along several lines. The membership had doubled during the year, the interest of the high school science teachers had greatly expanded, and the programs of the organization were reaching a much larger audience. The attendance at the meeting reached one hundred and eleven members, and thirty-one colleges and four high schools were represented at the meeting. The first Honor Paper was presented at this meeting, and Dr. Harold E. Finley (Zoology), Morehouse College, was accorded this distinct honor. His Honor Paper was titled, "A Review of Reproduction in Ciliated Protozoa". At this meeting, nine research papers were given in Biology, ten in Chemistry, two in Mathematics, one in Physics, one in Astronomy and three in Science Education. It was noteworthy that eleven scientific supply houses and organizations had exhibits at this meeting. This participation of exhibitors acknowledged the interest of industry and other organizations in the programs of the National Institute of Science. This meeting was very significant in that the organization for the first time became actively involved in matters of national scientific policies and took a position on a national policy and presented a resolution to be submitted to the appropriate Congressional committee in support of the formation of the National Science Foundation. The U.S. Senate Bill to establish the National Science Board encouraged independent research, provided financial assistance to non-profit institutions for support of research, and scholarships and fellowships to perform scientific research. The organization also prepared a resolu-

tion to be sent to the appropriate office of the Federal Government requesting the government to give attention to desirable legislation for improving science education in historically black colleges and schools. A very distinguished scientist, Dr. Murray Brown of Meharry Medical College, presented the major address at this meeting.

The Fourth Annual Meeting was held April 30 - May 2, 1947 at Howard University. After several years of preparation, the first Constitution was presented for approval at this meeting. It was at this meeting that the National Institute of Science formulated long range goals and plans in several definite directions. The first of these plans was the establishment of a publication in which the proceedings of the organization could be published, and the formation of an editing committee to serve as advisor to the publication. The second plan was for the organization of a study and development of science education research which would include the secondary school science programs as well as college science programs. The purpose of the joint study was to vitalize college teaching as well as providing a more meaningful preparation for students for their college work. The third plan was to initiate long range research programs on a cooperative basis among the scientists of the historically black colleges. The fourth plan was a long range plan to develop an annual talent search for capable high school students to pursue a career in science. Not only were these plans for the development of the organization, but they became the focus of the future direction of the organization. In many ways, the Fourth Annual Meeting was the beginning of a national assault on the problems in scientific` research and education at the historically black colleges and served to stimulate members to become more significant participants in the total scientific community. At the Fourth Annual meeting, the members authorized the Executive Secretary to publish a newsletter to be distributed quarterly. The first newsletter was prepared and distributed in January 1948 following the Annual Meeting. In keeping with the tradition of honoring an outstanding black scientist for research, the organization awarded to Dr. R. Percy Barnes of the Chemistry Department at Howard University the distinction of giving the Honor Paper. His presentation was entitled, "A Survey of the Studies on Alpha and Beta Diketones". At this meeting, retiring President Carl M. Hill of Tennessee A and I College delivered a very significant and challenging address in which he outlined the past, and set forth suggested guidelines for the future of the organization. This address had a very great impact on the future policies and direction of the organization, and served as a source for the unification of efforts to improve science education and to enhance the status of black scientists.

Following the Fourth Annual Meeting, the Executive Committee of the National Institute of Science met in Chicago (December 1947) to formulate plans to implement the suggestions that had been presented at the Fourth Annual Meeting by Dr. Carl Hill. Also, the organization received approval from the Conference of Presidents of Negro Land Grant Colleges to utilize \$250 to support the publication of a journal, the TRANSACTIONS and to increase dues to \$10. The Conference of Presidents agreed to help the organization secure government grants for research.

The Fifth Annual Meeting of the National Institute of Science was held at Tuskegee Institute April 1-3, 1948. More than one hundred eighty persons representing forty-one institutions attended this meeting. Twenty- nine research papers were presented. For the first time, the organization initiated the presentation of symposia on topics of concern to the members. The symposium at this meeting concerned Research in Small Colleges. This symposium helped to bring into focus important factors that influence the extent and kind of research available to small black colleges, the facilities needed, the financial resources available, and the administration of research grants. At this meeting, the members approved the Constitution that had been submitted to the membership at the previous meeting. The TRANSACTIONS was formally adopted as the official publication of the National Institute of Science, and Dr. Harold E. Finley, Howard University, formerly of Morehouse College, was selected as the first Editor of the TRANSACTIONS. Dr. Joseph A. Pierce (Mathematics) of Morehouse College was selected to give the Honor Paper at this meeting. The title of his paper was, "Sampling". The guest speaker at the Annual Banquet was Dr. Lloyd



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Cooke who at that time was Chairman of the Chicago Section of the American Chemical Society, a well known black scientist. This meeting marked the beginning of a policy to invite outstanding scientists as guest speakers at the Annual Banquet as a way of reaching out to other segments of the scientific community and to bring these persons in contact with black scientists. This meeting marked the first time that a regional meeting had been held at a time between annual meetings. This regional meeting was sponsored by the Eastern region. Subsequent to this regional meeting, the Southwestern region held a regional meeting, and since then have held very successful and well attended regional meetings. With this activity, the Regional Directors became more important in fostering the activities of the organization.

The Sixth Annual Meeting was held at Florida A and M College in Tallahassee, April 21-23, 1949, with more than one hundred and fifty members attending. Approximately forty research papers were presented. A symposium was presented on Science Education in Secondary Schools, which was directed toward the many high school teachers who were attending these meetings. Dr. William H. Robinson (Physics) of North Carolina College at Durham, presented an Honor Paper titled, "The Separation of the Line Components in H-Alpha of Hydrogen". At this meeting a public session was added to the agenda to provide an opportunity for the scientists to interact with other academic colleagues and interested persons in the local community. Dr. Paul Abersold of the Oak Ridge Laboratory gave the major address at the meeting.

At the Seventh Annual Meeting at Central State College (Ohio), April 20-22, 1950, a resolution was adopted by the National Institute of Science (NIS) and Beta Kappa Chi Scientific Honor Society (BKX) to hold a joint annual meeting of the two organizations. Since many scientists were members of both organizations, it was decided that it would be both efficient and less costly for the individual members to hold the meetings at the same time. Subsequent to this meeting, the two organizations have met jointly and have cooperated in many activities. Over two hundred members attended this meeting and forty-three research papers were presented in Biology, Chemistry, Physics and Mathematics, and Science Education. Several outstanding scientists from Oak Ridge National Laboratories and Antioch College presented papers. The union of BKX, a student oriented organization, and NIS brought together both students and teachers. However, Beta Kappa Chi had an earlier history of formation.

In 1923, three undergraduate students at Lincoln University (PA) founded BKX with the assistance of several dedicated teachers. Through this organization, these students wanted to encourage and advance scientific education through original investigations, to disseminate scientific knowledge, and to stimulate high scholarship in pure and applied science. Through correspondence, these students found an enthusiastic interest in developing similar science clubs on other predominantly black college campuses. This idea of a national student science organization grew at other campuses and this common bond between students at other institutions has evolved into the present organization of 56 chapters and over 11,000 initiates at the historically black colleges and universities. In 1929, BKX was incorporated in the state of Pennsylvania, and the first newsletter was published in 1943 (later named the Beta Kappa Chi Bulletin). In 1960, BKX was accepted as a member of the Association of College Honor Societies. This was a great achievement for the organization, and it still represents the only predominantly black organization to be so honored. The name became officially, Beta Kappa Chi Scientific Honor Society. It should be noted that many members of the National Institute of Science were also members of Beta Kappa Chi, and both organizations included many renowned black scientists in teaching and in industry.

Membership continued to grow at the Eighth Annual Meeting, held at North Carolina A and T College on April 19-21, 1951. Attendance approached two hundred and fifty members and fifty-six research papers were presented. This was the first meeting that an Honor Paper was not presented. Unfortunately, this practice of presenting Honor Papers, which had been a significant part of each Annual Meeting, was no longer continued after this meeting in

spite of the many achievements that were being made by black scientists in all areas of science, and which had been a significant part of the Annual Meetings. Dr. R. Percy Barnes, Howard University, presented a major paper on "Science in the National Emergency". Dr. C. K. Beck, Head of the Department of Physics and Director of Nuclear Development at the University of North Carolina was the guest lecture at the meeting.

The Ninth Annual Meeting was held at Prairie View A and M College April 16-19, 1952. This was the first meeting that the National Institute of Science and Beta Kappa Chi Scientific Honor Society met jointly after adopting the resolution. With the merger of the annual meetings, greater student participation was emphasized. This was the first annual meeting attended by a significant number of students. Previously, the NIS had focused its attention on a membership of science teachers and scientists in industry. With BKX focusing on honor students, participation by students increased tremendously, and more student activities were included. Forty-seven research papers were presented at this meeting with more than half presented by students. Dr. T. S. Painter, President of the University of Texas, gave the major address at this meeting on "Improvement of Standards in Negro Colleges".

The Tenth Annual meeting of the NIS and Second Annual Joint Meeting of BKX and NIS was held at Arkansas A M and N College on April 16-18, 1953. Most of the meeting was devoted to a reflection of the first ten years of the organization. A very comprehensive history of the first decade of the organization was given by Dr. Crouch who noted the modest beginning of the organization, that now attracted an attendance of over 200 members. Research papers were presented in Biology (13), Chemistry (19), Physics and Mathematics (10) and Science Education (5). Additionally, Dr. Crouch announced his retirement as Executive Secretary after nurturing and guiding the NIS through its formative years and into an era of growth and national reputation. Although Dr. Crouch retired from the office of Executive Secretary, he remained as Archivist. Dr. Moddie Taylor, Howard University, was an invited speaker, and gave a presentation on "General Education in Science".

After 10 years of growth and activity, the membership of NIS decided to take inventory of their activities to determine how to better serve black scientists in the future. At the 13th Annual Meeting in 1956, a committee was appointed to examine the progress of the organization and to make recommendations for the future. Focusing on the major goals of the organization, three areas of concern were examined: (1) identification of the original objectives of NIS, and the extent to which these objectives have been met, (2) identification of desirable objectives for effective action by NIS, (3) assessing the relationship of NIS and BKX. In its report in 1957, the committee concluded that the organization had maintained its original objectives through its national and regional meetings, and had effectively communicated its objectives to the scientific community through its TRANSACTIONS and the NIS Newsletter. The committee indicated that the organization should facilitate greater cooperation among all members of the scientific community to broaden the opportunities for the black scientist. This report served as a guide for the future direction of the NIS.

NIS and BKX continued to meet jointly on campuses of the various historically black colleges for many years until membership and attendance increased at the Annual Meetings beyond the capacity of the college campuses to accommodate the large number of participants. In 1963, the membership suggested that future meetings be held in the larger cities at facilities capable of handling approximately 400 participants. Although the Annual Meetings of the two organizations are held in the larger cities and in off-campus facilities, both organizations have maintained their close ties with the historically black institutions who serve as hosts. This strong bond between the two organizations and historically black institutions remains. The National Institute of Science has continued to grow and expand its programs. The discipline of Engineering was added to the membership. The programs and activities have become more national in scope and the organization has begun to address the national problems of blacks in science. The membership now has reached scientists at all of the predominantly black institutions, and many industrial labora-

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tories, government agencies, science associations and majority institutions. Through the years the emphasis on secondary school science programs has been greatly overshadowed by the college science education programs, but the organization has maintained contact with the secondary schools through many high school teachers who have maintained their membership in NIS and through programs developed within the organization that have been directed toward the secondary science teacher. The Junior Academy of NIS (JANIS) is a program initiated in 1980 to stimulate and motivate the pre-college student to seek and pursue successfully a career in science and engineering. The emphasis of the program has been at the local level with members providing assistance to teachers and developing programs to interest students in science and engineering. In recent years, this program has become dormant, primarily due to a lack of leadership. The membership of NIS continued to increase through active recruitment of college science students and the expansion of the membership to include engineering students.

The history of NIS involves continued growth, change and expansion, but it has not been without its problems. The period following implementation of the national Civil Rights Act of 1964, the membership decreased to a critical level. This was due to several factors. As a result of the civil rights emphasis in the 1960's, doors of many predominantly white institutions and organizations opened to black students and faculty. Consequently, many of the black colleges and universities, suffered enrollment losses and financial resources. These problems led to a reduction in allocations to the science departments and their members were limited in travel to the National Institute of Science meetings. The student science enrollment dropped dramatically at the predominantly black colleges and universities as more predominantly white institutions attracted these talented black students who previously attended one of the black institutions. At the same time, many science organizations opened their membership rolls to black scientists. In addition, many black scientists felt there was no longer a need for black organizations such as the National Institute of Science and that dual membership in organizations that had similar objectives was not needed. In 1971, after several years of deliberation and declining financial resources, the National Institute of Science suspended publication of the TRANSACTIONS because the cost of publication was a severe drain on the financial resources at a time when there was a need to conserve its limited resources for other programs. The TRANSACTIONS had been suspended previously (1953-1957) because of financial problems but had been revived. The next several years found the organization and its officers reevaluating its role and redirecting its focus and resources to achieve stability. After several years of budget control and a vigorous recruiting effort, the financial resources of the organization were restored to a level sufficient to revive the publication of the in 1975. In addition, blacks recognized that the perceived open doors during the 1960's and 1970's were not completely open. Blacks did not have a strong voice in the policy matters of these organizations and were accepted primarily for membership because their organizations needed to integrate. It became apparent that organizations, such as NIS played a vital role for the black scientists, and that there was a very strong need to express a unified voice for the black scientist. The black scientists reasoned that a method of confronting the discrimination that existed was by a show of strength. The unity that had created the effective organization of the black scientists in the past became a significant force in the scientific community. As a result, the membership grew dramatically and members came from all sectors of the scientific community. A spirit of ethnic pride and unity arose which aided in the resurgence of NIS as a vital force among the black colleges and universities and in the total scientific community. In addition, the corporations and laboratories across the country recognized the contribution that could be realized from this untapped potential of organized black scientists. Corporations and laboratories increased their representation exhibitors at the Annual Meetings. This participation provided a new level of communication between the black scientists and the larger scientific community.

During the 1960's and 1970's, several black science organizations evolved which focused on creating a greater awareness among blacks of the opportunities in various disciplines. Several organization leaders recognized that the coalescing of the power of these organizations could have a greater impact on the national scene and thereby

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represent a position of strength in addressing national science policy and the specific concerns of the black scientists. Over a period of several years (1971-1973), led by the leadership of Dr. Carl Speight, President of the Association of Black Physicists, a group of representatives of black science organizations held meetings to discuss the formation of a national federation of black science organizations. The Association of Black Mathematicians and the National Institute of Science were aware of the significance of presenting a common and strong front in the scientific community, and they utilized the strength of their organizations to promote this type of federated structure. However, many other black science organizations were small and fragile in structure and thus fearful of their role in such a federation of science groups. Thus, this plan was never consummated, but the effort did bring into focus the need to bring a strong force of a large number of members when confronting the scientific community on behalf of the black scientists.

In 1972, NIS was incorporated in the State of Virginia as a non-profit, tax exempt organization. This action was first suggested at the Third Annual meeting, but delayed until 1972. A few members had pushed for this action in order to make the organization eligible for grant funds from private and federal foundations to support the programs of the organization. This step strengthened the status of the organization in the scientific community. In addition, because of the pressure for integration at the national level, many companies and organizations sought the assistance of NIS to identify black scientists for employment. Thus, NIS gained greater respect in the scientific community.

In 1975, the Brookhaven Semester Program requested and was approved to join NIS and BKX in their joint Annual Meeting. The Brookhaven Semester Program (BSP) was established in 1968 as an outgrowth of an effort by several scientists at the Brookhaven National Laboratory to offer students of the historically black colleges and universities an opportunity to spend an academic semester at the Brookhaven National Laboratory to study and do research. In 1946, the government established Brookhaven National Laboratory (BNL) as a means of transferring to the private section the high energy technology acquired during the war effort. The laboratory was managed by the Associated Universities, Inc. (a group of northeastern universities) under contract with the Department of Energy. Scientists from these universities and industries conducted cooperative research in high energy technology, but blacks were not represented. In order to increase the participation of black scientists, this program was established. Students from the historically black colleges and universities are selected to participate based on their academic performance, junior standing, and a major in the sciences. Students spend 25-30 hours per week in research in a variety of projects and 3-6 hours of instruction. Students receive college credit for their work. They are required to write a report and to make an oral presentation of their research. Many of the students were members of NIS and BKX. Dr. Glen Price of Brookhaven National Laboratory and Dr. Amos Kennedy of Grambling University, a faculty liaison with the Laboratory were instrumental in effecting this union of the three organizations. They brought vision and energy to the union that resulted. This addition to the union of science organizations further increased the attendance and participation of students.

Throughout the history of the National Institute of Science, various leaders with energy, enthusiasm, and vision have emerged at an appropriate time to rescue a faltering organization. In the few years prior to 1970, NIS was struggling to find its direction and focus. Integration and economic conditions which had plagued many black institutions had impacted the viability of the organization. Membership and the interest declined. In 1970, Dr. Annie L. Richardson of Norfolk State University was elected the Executive Secretary, and devoted the rest of her life to restore the National Institute of Science to a viable organization. She was an energetic and dedicated teacher who recognized the need and value of such organizations to students and teachers. It was during her tenure as Executive Secretary that the membership grew from a low of 58 to over 400 members. She greatly increased the number of female students and scientists to actively participate in the organization. During her tenure, she promoted the incorporation of the orga-

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nization, the revision of the Constitution, and improved the quality of the TRANSACTIONS. It was during this time that the size of the number of attendees at the Annual Meeting necessitated the shift of the Annual Meeting from the campuses to hotels in the major cities to accommodate the large attendance. She initiated many positive changes in the organization which resulted in renewed interest on many campuses and in the scientific community. With Dr. Evelyn Thornton of Prairie View A & M University, she initiated the program, Junior Academy of the National Institute of Science (JANIS), which was designed to attract more minorities into science by developing a program for the pre-college student. Unfortunately, this latter program lost its momentum after a few years. While serving as Executive Secretary, Dr. Richardson spent a sabbatical year at the National Institutes of Health (NIH). While at NIH, she persuaded Dr. Elwood Bynum, Director of the Minority Access to Research Careers (MARC) program to consider providing support for the Annual Meetings of these three organizations. The NIS submitted a proposal to NIH which resulted in an award in 1981 to provide travel funds for students to attend the Annual Meeting, to provide operational expenses for the Annual Meeting, and to provide funds for the publication of the papers presented at the meetings. This action further stimulated the growth and activities of the organization as well as attendance at meetings. This funding source continued for over ten years and resulted in enhancing the integrity and professional status of the organization. The death of Dr. Annie Richardson in 1983 was a severe blow to her family, friends and to NIS. She had dedicated a major part of her life with unbounded energy, enthusiasm and hard work to the advancement of her students and of the NIS. With her passing, a void was left in the leadership of the organization, and the organization has lost its impetus in recent years. Her impact on the organization will be a part of the history of NIS.

The passing of Dr. Crouch in 1980 and Dr. Thomas W. Turner in 1978 at the age of 101 sparked an interest in rededication of the members to the dream of Dr. Crouch and Dr. Turner to raise the level and role of the black scientist through participation in education and research. Dr. Arthur C. Washington of Prairie View A & M University and Executive Secretary of NIS felt the need to revisit the concept of the Honor Paper which had been discontinued. Through his efforts, the organization revived the recognition of those black scientists who had made contributions to these efforts. In recognition of the many contributions of black scientists, the organization initiated the Memorial Lecture series. This program was designed to invite outstanding and current black scientists who are making significant contributions to science to present a formal science lecture as a manner of memorializing the leaders who had given so much to the organization. Some of the scientists who have given a Memorial Lecture are:

Dr. Arthur C. Washington Researcher and Teacher, 1984 Prairie View A & M University

Dr. Kenneth Olden  
Deputy Director, 1985  
Cancer Center, Howard University

Dr. Clarice D. Reid  
Chief, Sickle Cell Disease Branch, 1986 National Heart, Lung and Blood Institute National Institutes of Health

Dr. Edgar G. Epps  
Marshall Field IV Professor of Urban Education, 1987  
University of Chicago

Dr. Julian M. Earls  
Director, Office of Health Services, 1988 NASA Lewis Research Center

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Dr. James A. Donaldson  
Chairman and Professor of Mathematics, 1989 Howard University

Dr. George H. Simmons  
Department Head, Mass Memory  
Subsystems, 1990  
American Telephone and Telegraph Laboratories

Dr. Carl B. Pickett  
Executive Director of Research, 1991  
Merck Frost Center for Therapeutic Research

Dr. Fredric Van Catledge  
Senior Specialist, Scientific Computer Division, 1992  
E. I. Nemours Company

Dr. Griffin Rogers  
Clinical Scientist, 1993 National Institute of Diabetes, Digestive and Kidney Diseases

In 1982, the National Institute of Science applied for and was accepted as an affiliate of the American Association for the Advancement of Science (AMS). NIS at that time was one of only two minority science organizations that was an affiliate of the AAAS. The other group was the American Association of Blacks in Energy. Both groups were accepted as affiliates in the same year. NIS has accepted and fulfilled its responsibility as an affiliate by promoting the concerns of the black scientists. This affiliation has been a source of mainstreaming the black scientist in the scientific community. In 1982, with the untiring effort and organizational skills of Dr. Gertrude Ridge! of Kentucky State University and Dr. Clarice Reid of the National Institutes of Health, the National Institute of Science co-sponsored a symposium on Sickle Cell Disease at the Annual Meeting of AMS in January 1982. This symposium attracted some of the leaders in research in the area of sickle cell disease. Some of the major researchers in the area of sickle cell work were invited to present papers at the symposium. A large number of scientists and non-scientists attended this symposium. In addition, NIS had an exhibition booth at the meeting, which enhanced the visibility of the organization as an important entity of the scientific community.

At the Fifth Annual Meeting, NIS initiated the program of inviting outstanding national leaders in the scientific community to address the members at the Annual Meeting. These invitations were designed to improve the interaction between members of the organization and other science leaders, and to enlighten the scientific community of the capability of black scientists and of the organization. The organization is pleased to have some of the most outstanding scientists as part of their meetings. Some of these invited leaders have been: Dr. Lloyd Cooke, Vice President of Union Carbide Company and former Chairman of the Chicago Section of the American Chemical Society; Dr. Alan T. Waterman, Director of the National Science Foundation; Dr. Allan V. Astin, Director of the National Bureau of Standards; Dr. Alan T. Waterman, Director of the National Science Foundation; Dr. Eric Rogers of Princeton University; Dr. G. P. Harnell, Physicist of University of Pennsylvania; Dr. J. . Ernest Wilkins, noted black mathematician; Dr. John Slaughter, Director of the National Science Foundation; Dr. Thomas Malone, Acting Director of the National Institutes of Health; Mr. Mervyn Dymally, Congressman from California and Head of House Committee on Science; Dr. Arthur C. Cope, President elect of the American Chemical Society; Dr. William O. Roberts, Director of High Altitude Observatory, University of Colorado; Dr. Fletcher Watson, Harvard University; Mr. Louis Stokes, Congressman from Ohio; Dr. William Cadbury, Dean, Haverford College; and Dr. Fletcher Watson, Harvard University.

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Now, after 50 years of existence, the founders of the National Institute of Science can be proud of the direction and success of an organization that was only a dream. Its impact on the lives of many of its members is immeasurable. Their dream has endured through the efforts of their students and the enthusiastic loyalty that they have instilled in the leaders that followed. The rich heritage that has been provided over the years suggests that the organization will become a greater force in the future in the scientific confluence in the career choices of many students. The beacon of light turned on by the founders shines bright and wide. During these 50 years, NIS moved from an organization of black scientists which had been excluded from the mainstream of the scientific community to an organization which is highly regarded in the scientific community. It has provided a forum for many black scientists and researchers to demonstrate their skills in research and teaching. The mantle of leadership has passed through the years to others to sustain the growth and provide fertile ground for the development of many young minds and of future potential scientists as well as the organization. Certainly the founders of NIS can be justly proud of their dream. Their dream has endured through the efforts of their students and the enthusiastic loyalty that they have instilled in the leaders that followed.

# AWARDS BANQUET & 70th ANNIVERSARY GALA

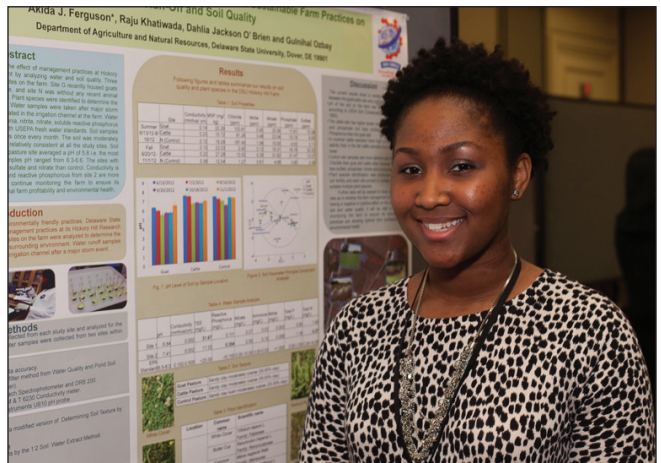




# AWARDS BANQUET & 70th ANNIVERSARY GALA



# ORAL & POSTER SESSIONS



## EXHIBITORS & MARKETPLACE



# Special Event

*See and Learn*

# SCIENCE IN THE CAPITAL

# SCIENCE IN THE CAPITAL CITY



70th Joint Annual Meeting of BKX and NIS  
Reston, VA ~ March 2013  
University OF The District OF Columbia, Host

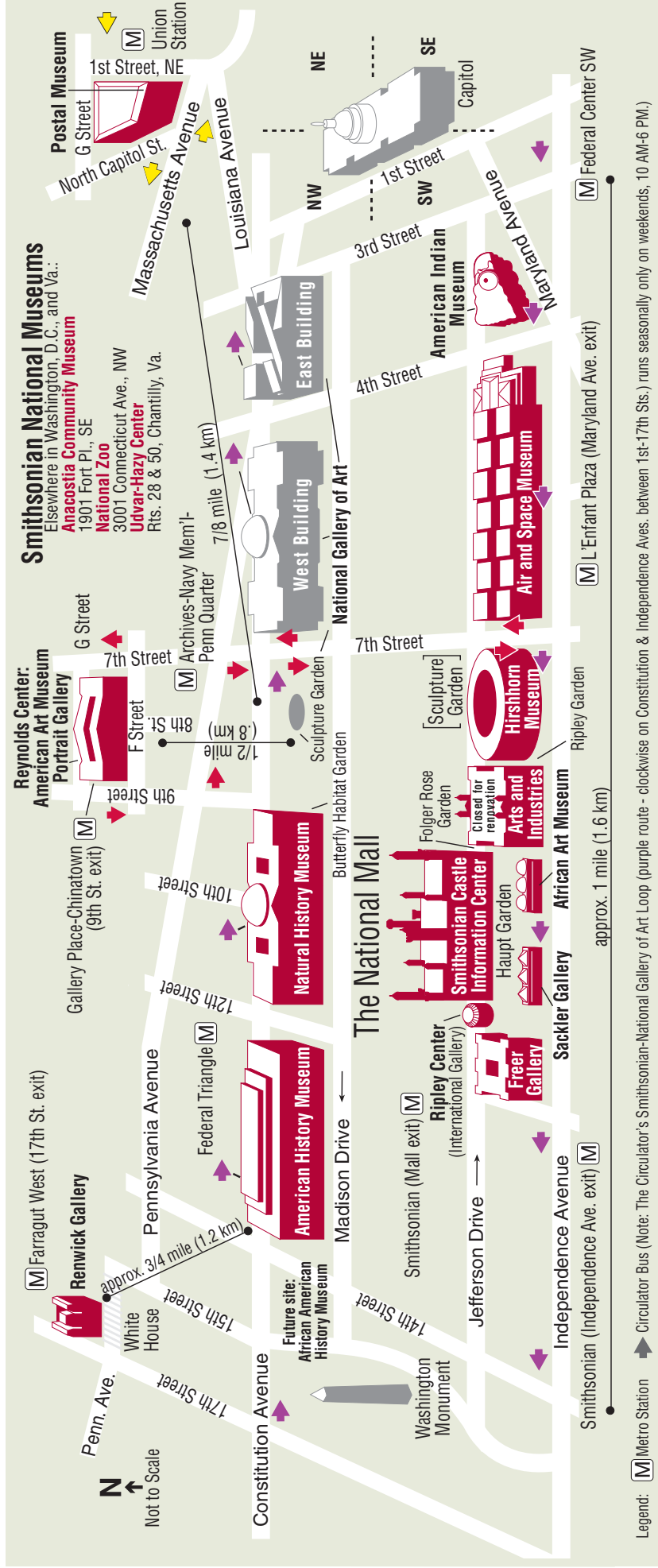
Colella Photo



NATIONAL MALL MAP



# Smithsonian Institution



Produced by: Smithsonian Information Center (located in the Castle)  
 1000 Jefferson Drive, SW, Washington, DC  
 202-633-1000 (voice/tape); 202-633-5285 (TTY)  
 Open daily 8:30 a.m.-5:30 p.m.; closed December 25

Note: Information subject to change without notice. Current as of 10/2009.

# M System Map

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- ## Legend
- Red Line • Glenmont to Shady Grove
  - Orange Line • New Carrollton to Vienna/Fairfax-GMU
  - Blue Line • Franconia-Springfield to Largo Town Center
  - Green Line • Branch Avenue to Greenbelt
  - Yellow Line • Huntington to Fort Totten



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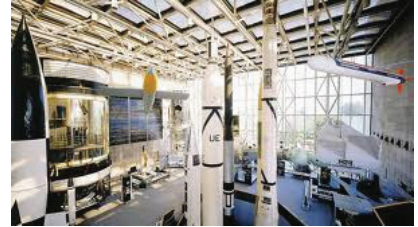
REV 10/27/06

- No Smoking
- No Eating or Drinking
- No Animals (except service animals)
- No Audio (without earphones)
- No Litter or Spitting
- No Dangerous or Flammable Items



## NATIONAL AIR AND SPACE MUSEUM

Independence Ave at 6th St, SW  
Washington, DC 20560  
Info: 202-633-2214



A center of history, research, and education, the National Air & Space Museum on the National Mall remains the most visited museum facility in the world averaging over nine million people annually. Located in close proximity to the U.S. Capitol, the National Air and Space Museum is one of 19 museums under the Smithsonian Institution complex in Washington, DC. The National Air and Space Museum, and its facilities, houses the world's largest collection of historic aircraft and spacecraft: Over 156 years of global aeronautical and space travel history in the form of 50,000 artifacts, ranging from Space rockets, shuttles, and jetliners to lunar rocks and microchips are meticulously restored, preserved, documented and recorded for all time. In addition, the museum is a vital center for historical research on aviation and spaceflight and the related science and technology. It is home to the Center for Earth and Planetary Studies, which performs original research and outreach activities on topics covering planetary science, terrestrial geophysics and the remote sensing of environmental change. Pre- and post-doctoral research fellowships are offered in the Museum's research divisions. The museum is also a center for education and programs related to the STEM disciplines (science, technology, engineering and mathematics). Undergraduate students can apply for summer internships working in one of the Museum's departments. Interns work directly with Museum staff conducting research, designing and building exhibits, preserving or restoring artifacts, or developing educational materials.

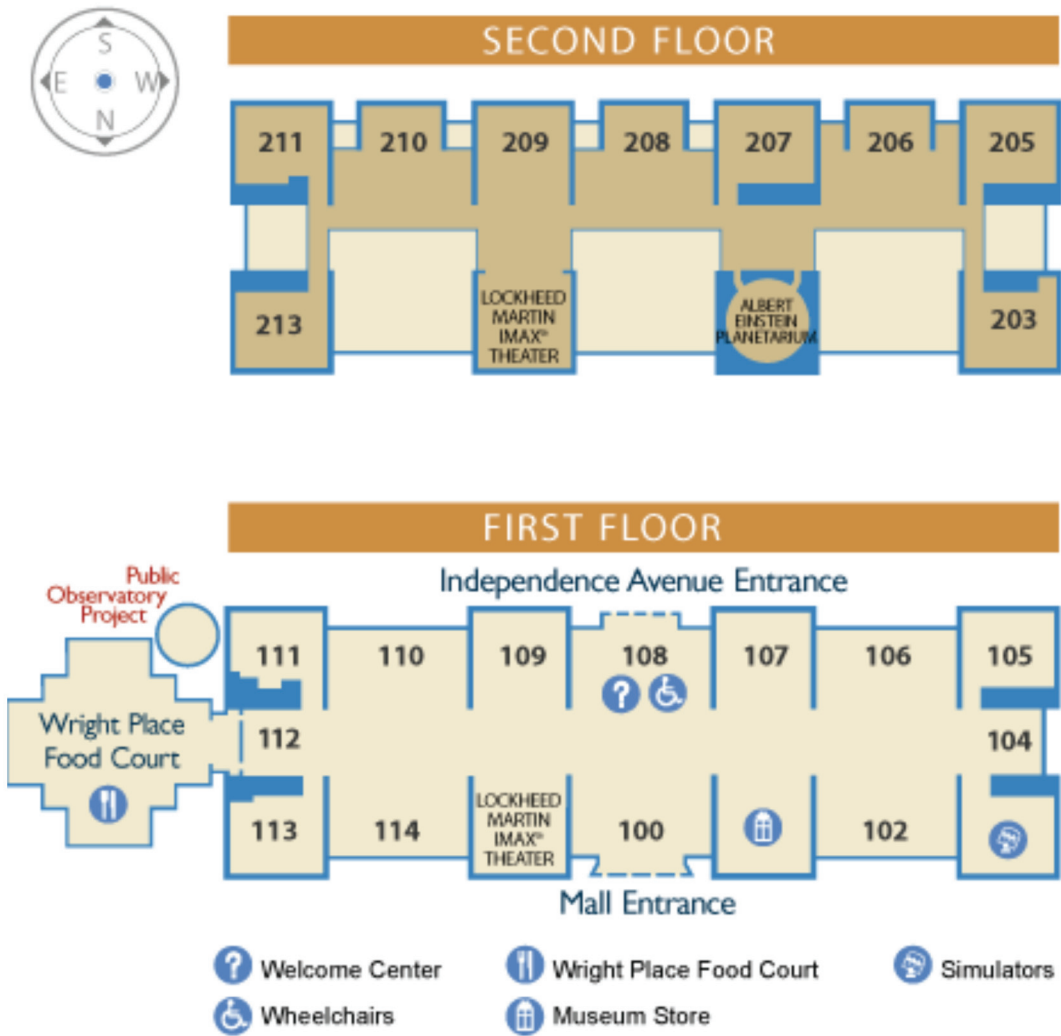
### **A brief history**

The Smithsonian's aeronautical collection began in 1876 when a group of kites was acquired from the Chinese Imperial Commission. Aeronautical artifacts were displayed in the Smithsonian's Arts and Industries Building and later in a nearby shed. After World War II, the collection had become impressive enough for President Harry S. Truman to sign Public Law 722, in 1946, establishing the Smithsonian facility as the National Air Museum whose official mission is to collect, preserve, document and display aeronautical equipment to provide educational material, in an all out effort to "memorialize" the development of aviation.

In the 60's America was embarking on exploring a new frontier, Outer-space and Space Travel. In 1966, President Lyndon B. Johnson signed Public Law 89-509: 1) changing the name of the National Air Museum to the National Air and Space Museum to now memorialize the development of spaceflight as well as aviation; and 2) authorizing the construction of a new museum building on the National Mall whose collection will now include rockets, missiles and various artifacts related to spaceflight. The new museum opened in July, 1976. The museums collection is so extensive that only 10 percent of the artifacts can be displayed at once in the new building.

The Smithsonian's Board met in 1980 and proposed that a second facility in the Washington, DC metropolitan area be established, near an airport so that: 1) most of the stored artifacts (80%) can displayed; and 2) some of the artifacts can be flown directly in 'on-site'. Thirteen year later (1993) President Bill Clinton signed Public Law 103-57 establishing an extension of the museum at Dulles International Airport in Virginia. In 1996 Clinton signed Public Law 104-222 authorizing the construction of a new companion facility using only privately raised funds. This companion facility was built by private funding and opened in December 2003 as the Steven F. Udyar-Hazy Center.

The museum has 22 exhibition galleries, an Imax Theater, and the Albert Einstein Planetarium



100	Milestones of Flight	203	Sea-Air Operations
102	America by Air	205	World War II Aviation
103	Flight Simulator Zone	206	Legend, Memory and the Great War in the Air
104	Military Unmanned Aerial Vehicles (UAV)	207	Exploring The Planets
105	Golden Age of Flight	208	Barron Hilton Pioneers of Flight
106	Jet Aviation	209	The Wright Brothers & The Invention of the Aerial Age
107	Early Flight	210	Apollo to the Moon
108	Welcome Center		
109	How Things Fly		
110	Looking at Earth		
111	Explore the Universe		
112	Lunar Exploration Vehicles		
113	Moving Beyond Earth		
114	Space Race		

## NATIONAL MUSEUM OF NATURAL HISTORY

10th Street & Constitution Avenue, NW,  
Washington, DC, 20013-7012  
naturalexperience@si.edu  
202.633.1000

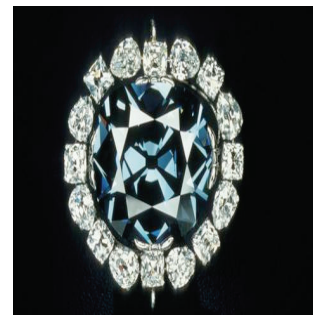
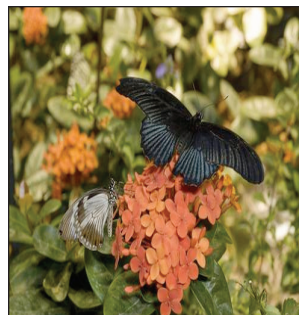
The National Museum of Natural History (NMNH) is one of the premier museums of the Smithsonian Institution, the number one museum and research complex in the world. Opened in 1910, the museum was the first Smithsonian building erected exclusively to house the nation's preeminent collections and its associated research facilities.

Majestic and massive, the building spans 1.5 million square feet of space; about the size of 18 football fields. The space is filled with all manner of preserved specimens from land, sea and air; early man, prehistoric dinosaurs, gigantic whales to the tiniest insect. Its minerals collection contains some of the rarest gemstones on earth. Until recently, the museum housed the largest diamond in the world ever cut and set into a piece of jewelry, the Hope Diamond. A few of the other museum's collections are: 30 million insects; 4.5 million plants, 7 million fish, 2 million cultural artifacts and over 400,000 preserved photographs.

The National Museum of Natural History is also a major repository of cultural heritage. The museum has constructed many displays depicting daily life scenarios around the world and across the millennia: From the gathering around the campfire with fellow cavemen, to fishing in the waters near an Inuk Village, to bringing home the spoils of the hunt to the African village for communal consumption. These displays depict that although 'humankind' is comprised of many races and ethnicities, we all share the common need of acquiring food, shelter, and clothing and the desire to protect the general well-fare of our families and communities.

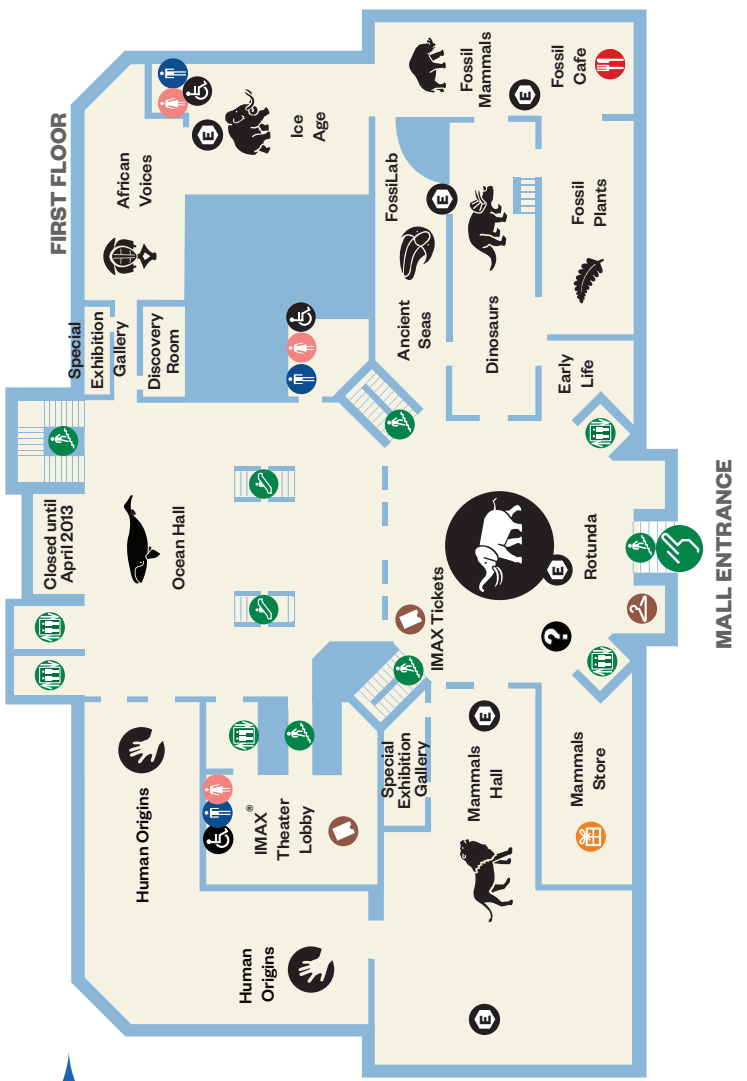
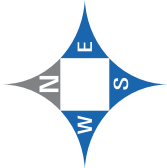
Imagine the National Museum of History as a rare artifact in itself, "the world's largest science classroom" whose 126 million artifacts and specimens is preserved, maintained, recorded, documented and protected by over 1000 employees. 150 or more of these employees are American and international scientists and curators who are engaged in research on every continent, studying, documenting and preserving the history of life on the planet Earth IN ALL ITS DIVERSITY through its The Global Genome Initiative, NMNH Biorepository, The Field Book Project and Interdisciplinary Research Projects, just to name a few. Though built in 1910, the museum has not been left behind, by being outfitted to become a major hub of international electronic education for anyone who has access to a computer to link-in to its seemingly limitless on-line resources, educational programming and interactive websites: Over 600,000 visits have been recorded to the museum's databases.

FROM DINOSAURS TO DIAMONDS...WHAT'S NOT TO LOVE HERE!



# National Museum of History Map

	ATM		MUSEUM STORE
	CLOAKROOM/LOCKERS		RESTAURANT
	ELEVATOR		RESTROOMS
	ENTRANCE		SECURITY
	ESCALATORS		STAIRS
	EVOLUTION TRAIL		TELEPHONE
	HEALTH UNIT		TICKETS
	INFORMATION		WHEELCHAIR ACCESS



## UNITED STATES BOTANIC GARDEN

100 Maryland Avenue SW, Washington, DC  
202-225-8333  
www.usbg.gov

Steeped in history, rich with tradition, the United States Botanic Garden (USGB) is one of the oldest botanic gardens in North America. It showcases the importance and often irreplaceable value of plants to the well-being of humankind and to earth's fragile ecosystems. The Garden highlights the diversity of plants worldwide as well as their aesthetic, cultural, economic, therapeutic, and ecological significance. In 1820, the U.S. Congress granted land for a national botanic garden and the U.S. Botanic Garden was formally founded in 1850. The U.S. Botanic Garden maintains more than 12,000 accessions, comprising about 65,000 plants for exhibition, study, conservation and exchange with other institutions. Noteworthy collections include economic plants, medicinal plants, orchids, carnivorous plants, cacti and succulents, Mid-Atlantic native plants and ferns. Several specimen date from the U.S. Exploring Expedition (1838-1842).

The U.S. Botanic Garden is a living plant museum and accredited by the American Association of Museums. There are three public components of the U.S. Botanic Garden:

- The **Conservatory** houses the following displays and exhibits: Garden Court, Jungle, Plant Adaptations, garden Primeval, Hawaii, World Deserts, Medicinal Plants, Orchids, Plant Exploration, Rare and Endangered Species, Southern Exposure (seasonally), Children's Garden (seasonally), "Plants in Culture" in the West Gallery and temporary exhibits in the East Gallery.
- The **National Garden** features a Regional Garden of Mid-Atlantic Native plants, a Rose Garden devoted to the national flower, a Butterfly Garden, a First Ladies Water Garden and an amphitheater.
- **Bartholdi Park** houses historic **Bartholdi Fountain** with gardens continuously updated to reflect modern trends in American horticulture and new plant introductions.

A number of exhibits are available all year and located in the Conservatory.

- Garden court-features economic and ethnobotanical plants including those used in products such as fibers, food, beverages, cosmetics, wood, spices and others.
- East Gallery-An every-changing venue for temporary exhibits.
- Medicinal Plants-Explores the origin of plant medicine and displays a collection of medicinal plants from all over the world.
- Garden Primeval- A reconstructed Jurassic landscape of ferns and other ancient plant groups that have survived for 150 million years.
- Plant Adaptations-Shows some of the fascinating adaptations that have evolved in the plant world.
- Orchids-An ever-blooming, ever-changing display of these mythic plants. The USBG collection numbers about 5,000 specimens.
- Rare and Endangered Species- A changing display of rare, threatened or endangered plants and habitats.
- Jungle-A tropical rainforest overtakes an abandoned plantation. The dome rises to 93 feet and has a mezzanine level from which to view the jungle canopy.

# UNITED STATES BOTANIC GARDEN

## Campus Map



# 70th NIS/BKX

## Joint Annual Meeting

# AWARD WINNERS

## GRADUATE ORAL PRESENTATIONS

### Graduate Session B I

#### I Prize Winner

#### ***Glut4 Overexpression Protects Against Insulin Resistance***

**Brittanie J. Atkinson**<sup>1</sup>, Beth A. Griesel<sup>2</sup>, Caleb D. King<sup>3</sup>, Miranda A. Josey<sup>2</sup>, Ann Louise Olson<sup>2</sup>. Department of Biology, University of Oklahoma, Norman, OK; <sup>2</sup>Department of Biochemistry and Molecular Biology, The University of Oklahoma Health Sciences Center, Oklahoma City, OK; <sup>3</sup>Department of Biology, Oklahoma Christian University, Edmond, OK,

GLUT4 is important for insulin-mediated glucose uptake. GLUT4 protein levels affect insulin sensitivity and the development of insulin resistance. It is down regulated during insulin resistant states. Yet, the effects of altering GLUT4 protein level are not known. Herein, we test the hypothesis that moderate overexpression of human GLUT4, under the regulation of its promoter, can prevent insulin resistance resulting from obesity. Transgenic mice engineered to express the human GLUT4 gene and promoter (hGLUT4 TG) and their non-transgenic counterparts (NT) were fed either control diet (CD) or high fat diet (HFD). Calculation of HOMA-IR scores revealed that hGLUT4 TG remained insulin sensitive while receiving the HFD. Immunoblots showed GLUT4 expression is 2 fold higher in TG mice compared to non-transgenic mice (NT) regardless of the diet fed. Both strains decreased GLUT4 protein in white adipose when fed a HFD. hGLUT4 TG retained GLUT4 protein in muscle and brown adipose tissue. The GLUT4 transgene masked hepatic insulin resistance; mRNA analysis demonstrated loss of insulin-mediated repression of gluconeogenic gene in all HFD mice

after fasting. hGLUT4 TG lost the insulin-dependent regulation of SREBP-1c mRNA expression in response to the transition from the fasted to the fed state. This and the diversion of carbohydrate to peripheral tissues suggest *de novo* lipid fatty acid synthesis and cholesterol synthesis may be lower in hGLUT4 TG mice. In conclusion, this data supports a moderate increase in GLUT4 protein expression is a good target for treatment of insulin resistance. [Support: NIH DK081545, NSF HRD – 0929135, & OK-LSAMP]

#### II Prize Winner

#### ***Increased Dietary Intake of Vitamin A Promotes Aortic Valve Calcification In Vivo***

**Harriet Hammond**<sup>1,2</sup>, Danielle Huk<sup>2</sup>, Hiroyuki Kegechika<sup>3</sup>, Joy Lincoln<sup>2</sup>. <sup>1</sup>Southern University and A&M College, Baton Rouge, LA; <sup>2</sup>Department of Molecular and Cellular Pharmacology, University of Miami Miller School of Medicine, Miami, FL; <sup>3</sup>Tokyo Medical and Dental University, Tokyo, Japan.

Calcific aortic valve disease (CAVD) is a major public health problem with no effective treatment available other than surgery. We previously showed that mature heart valves calcify in response to retinoic acid (RA) treatment through down regulation of the SRY transcription factor Sox9. In this study, we investigated the effects of excess vitamin A and its metabolite RA on heart valve structure and function in vivo and examined the molecular mechanisms of RA signaling during the calcification process in vitro. Using a combination of approaches, we defined calcific aortic valve disease pathogenesis in mice fed 200 IU/g and 20 IU/g of retinyl palmitate for 12 months at molecular, cellular, and functional levels. We show that mice fed excess vitamin A develop aortic valve stenosis and leaflet calcification associated with increased expression of osteogenic genes and decreased expression of cartilaginous markers. Using a pharmacological approach, we show that RA-mediated Sox9 repression and calcification is regulated by classical RA signaling and requires both

RA and retinoid X receptors. Our studies demonstrate that excess vitamin A dietary intake promotes heart valve calcification in vivo. Therefore suggesting that hypervitaminosis A could serve as a new risk factor of calcific aortic valve disease in the human population.

### III Prize Winner

#### ***State of Care for Veterans with HIV/AIDS 2011***

**Arnesha Williams**, Abigail S. Newsome-Mississippi Valley State University, Itta Bena, MS.

The purpose of this report is to characterize the US Department of Veterans Affairs (VA) Veterans Health Administration (VHA) state of care for its population of Veterans in care for HIV/AIDS. The first step in providing responsive care is to learn about the affected population. This State of Care report describes the distribution of Veterans with HIV/AIDS within VHA and provides basic demographic data on this population. Additionally, the report describes pharmacologic treatment, other conditions commonly seen with HIV, monitoring, screening, and vaccinations. This report is intended to provide data which can be used to assess and guide interventions to improve the quality of care VHA delivers to Veterans with HIV/AIDS. Much of the data presented in this document comes from VHA's HIV registry, known as the Clinical Case Registry (CCR).

## Graduate Session-B II

### I Prize Winner

#### ***Investigating the Effects of Metal Chelating Complexes on the Electrochemical Properties of Cathode Material***

**Augusta A. Smith**, Scott A. Wicker, Edwin H. Walker, Jr. Department of Chemistry. Southern University and A&M College, Baton Rouge, LA.

Recent research on lithium batteries has focused on the use of composite material to improve both its performance and safety. Furthermore, our research investigates the effects of chelating (organic-inorganic) complexes on the electrochemical properties of cathode material. The purpose of the study is monitor the affects of the adjusted pH of solution to optimize complete coordination chemistry of our cathode material and continue to explore the kinetics that govern the decomposition reaction mechanism to synthesize

various cathode material. We hypothesize that NTP, water soluble and environmentally friendly compound will help enhance the self-propagating combustion synthesis process by lowering the time and temperature needed to synthesize quality material.

### II Prize Winner

#### ***Healthy Minds: Healthy Lives***

**Jackie Ojuka**<sup>1</sup>, Sajid Hussain<sup>2</sup>. <sup>1</sup> Department of Psychology and <sup>2</sup>Department of Computer Science, Fisk University, Nashville, TN.

Infant mortality rates have been targeted by the United States as a goal of the federal Healthy People Act 2010. Depression, and its effects, is one of the many factors influencing infant mortality. There is a need to highlight the importance of mental health on physical wellbeing and dispel myths and stigmas held particularly by the African American community about mental health. This study specifically aimed to increase awareness about the effects of depression on reproductive health and maternal and infant wellbeing. An intervention, "Midnight Spa" was held to assess current knowledge about depression, preconception health and infant mortality, measure depression in participants using the Beck's Depression Inventory; and promote awareness about behaviors associated with depression that impact fetal and infant vitality. Participants were female African American college students ages 18 to 25 and data was collected using a pre-test/post-test measures. Participants demonstrated increased knowledge about depression as a disease as indicated by the identification of symptoms and risky behaviors and their impact on pregnancy health and infant vitality. Women play a large role in achieving healthy pregnancies and in contributing to the success of children. Through the implementation of this study, African American women of child bearing age have been empowered to be positive change agents within their families and within their communities.

### III Prize Winner

#### ***A Redesigned General Chemistry Lab Course to Improve Students' Performance through Inquiry Based Learning***

**Deveine Toney**, Angela Winstead. Department of Chemistry, Morgan State University, Baltimore, MD.

Inquiry based learning incorporated into a laboratory



course encourages students' problem solving and critical thinking skills. This paper describes our transition from a course comprised of traditional laboratory experiments that provided students with a series of prescribed steps with a method to produce the expected results to a student centered method of instruction. The general chemistry laboratory course was redesigned to include integrated critical thinking exercises, technical writing, classroom preparation, and experimental design. Major challenges encountered were converting existing experiments to "projects"; preparation of students with fundamental skills necessary to conduct the experiments, student participation and motivation; and student performance assessment. We discuss how these challenges were addressed using classroom management software and adopting best practices from our recently developed Research Process used in undergraduate research training programs (Winstead, 2010). The lecture grades of students enrolled in the lecture and laboratory concurrently were analyzed. Students enrolled in the traditional laboratory (n= 323) were compared to students enrolled in the inquiry laboratory (n= 144). The overall percentage of students earning As and Bs increased from 26% to 42%. The NSF supported Critical Thinking Assessment (CAT) test will be administered as an additional assessment tool.

## UNDERGRADUATE ORAL PRESENTATIONS

### Biology-A

#### I Prize Winner

##### ***The Production of Xanthan Gum as a Sustainable Source of Hydraulic Fracturing***

**Lindsay Davis**<sup>1</sup>, John Tomich<sup>2</sup>, Ben Katz<sup>2</sup>, Deane Lehmann<sup>2</sup>. <sup>1</sup>Department of Chemistry, Langston University, Langston, OK; Department of Biochemistry and Molecular Biophysics, Kansas State University, Manhattan, KS.

For many years, scientists have been searching for more sustainable ways to support life on Earth. The fossil fuels that have been used for millions of years are depleting, leaving researchers to find quick solutions. Hydraulic Fracturing is a fairly new process that extracts oil, natural gas, geothermal energy, and other resources from the shale layer of the Earth. How exactly do we

get the resources without damaging and contaminating the environment? To date, Guar Gum and Kerosene are being used to produce fracking fluid that makes the process run smoothly. However, these two products are non-biodegradable and expensive. This project investigates the benefits of using less expensive, biodegradable products such as Xanthan Gum and Glycerol as alternatives in fracking. We discovered a technique that allows Xanthan Gum to be grown from *Xanthomonas campestris*, which is found in plants. Using our efficient technique to produce Xanthan Gum will be beneficial for two reasons. First, growing Xanthan Gum from Immobilized Bacteria would secure the food supply and reduce its cost; presently most of the fracking gum is taken from the food supply, adding to elevated food prices. Second, this technique may reduce America's gas prices and dependency on foreign oil by making fracking more sustainable via using less expensive techniques and using biodegradable material.

#### Joint II Prize Winners

##### ***Effect of Diallyl Trisulfide (DATS) on MIEN1 Mediated Prostate Cancer Progression***

**Lionel Brown**<sup>1</sup>, Pankaj Chaudhary<sup>2</sup>, Jamboor K. Vishwanathan<sup>2</sup>. <sup>1</sup>Department of Biological Sciences, Southern University A&M College, Baton Rouge, LA; <sup>2</sup>Department of Molecular Biology and Immunology, University of North Texas Health Science Center, Fort Worth, TX.

MIEN1, a novel tumor biomarker located in the chromosome 17q12 amplicon, is highly expressed in prostate cancer cell lines and tumors, compared to minimal expression in normal prostate cells and tissues. MIEN1 expression has been reported to positively correlate with grade and stage of prostate cancer progression. It is known that MIEN1 is involved in the migration and invasion of prostate cancer through isoprenylation, a post-translational modification. MIEN1 contains a CVIL motif and is modified by the enzyme geranylgeranyltransferase-I (GGTase-I) facilitating its association with the inner leaflet of the plasma membrane. Prenylated MIEN1 induces filopodia formation and promotes cell migration. Previous studies have shown that the prenylation of MIEN1 can be inhibited by GGTI-DU40, a chemical inhibitor of GGTase-I. Diallyl trisulfide (DATS), a garlic-derived chemopreventive organosulfur compound, has been shown to induce disruptions of microtubule formation in human colon cancer cells by reacting with the sulfhydryl groups in prenylated proteins resulting in mitotic arrest and apoptosis. This led to the overall hypothesis that

DATS reduces cell migration through MIEN1 in prostate cancer. The purpose of this study is to compare the effects of DATS on cell proliferation and cell migration in DU145 prostate cancer cells with downregulation of MIEN1. By using different methods like MTT cell proliferation assay and scratch assays for cell migration, the effects of these inhibitors were studied. We saw that DATS inhibits the growth of DU145 cells which has high expression of MIEN1 as compared to PWR1E cells (normal prostate cells) which has low expression of MIEN1. In conclusion, our data show that DATS is an effective inhibitor of cell proliferation and migration through its effect on MIEN1 prenylated protein.

### ***An Intervention Activity to Reduce Childhood Obesity in Selected African American Pre- School Children***

**Marsha Collins**, Djethina Yarhaxia Constane, Virginia Howard, Barbara Harvey. Department of Nutrition And Dietetics, University of the District of Columbia, Washington, DC.

Because of the prevalence of obesity among pre-school children in the District of Columbia, three selected centers were consulted and requests were made to engage parents in an intervention to reduce childhood obesity among their pre-school children. This intervention began by asking parents to participate in this project. The intervention began by determining the body mass index measurements of the children and by having their parents consent to attend workshops specifically designed to alleviate the problem of childhood obesity among this selective group. During the initial workshop, parent profiles, consent forms, and a pre-questionnaire designed to determine the parents' base-line knowledge, health behavior, obesity prevention skills were completed. Subsequent workshops included a presentation by a nutritionist who gave an overview of the importance of proper balanced diets, factors that influence food and nutrition intake, the basic nutrients and their functions, and principles of feeding pre-school children, as well as data on the National Health Epidemic on Obese Children. The third workshop included exercises for maintaining a healthy body weight, while the fourth introduced the use and benefits of the National Library of Medicine Online Health Resource to obtain reliable health information. Data analyses have been completed on the biographical information, the pre-screening BMI data on the pre-school children and the pre-questionnaire. It was found that most of the children had BMIs within the normal range. This was unexpected because the parents had limited obesity

prevention knowledge and many appeared to be extremely overweight or obese themselves. (*Support by the NSF/HBCU-UP-HRD-0928444*).

## Biology-B

### I Prize Winner

#### ***Involvement of p38 MAP Kinase, but not ERK-1/2, in Histamine-Induced Endothelial Actin Reorganization and Barrier Disruption***

**Curtis Lawrence**<sup>1</sup>, Eyong Madonia<sup>1</sup>, Joseph O. Olubadewo<sup>1</sup>, Jerome W. Breslin<sup>2</sup>. <sup>1</sup>Department of Natural Sciences, Biology Unit, Southern University at New Orleans, New Orleans, LA. <sup>2</sup>Department of Molecular Pharmacology and Physiology, University of South Florida, Tampa, FL.

We tested the hypothesis that histamine disrupts the endothelial barrier by activation of the p38 MAP kinase and ERK1/2. Transendothelial electrical resistance (TER) of human umbilical vein endothelial cells (HUVEC) grown on small gold electrodes served as an index of barrier function, before and after addition of 10 $\mu$ M histamine. The role of p38 MAP kinase was tested with a 6 $\mu$ M SB203580 and ERK-1/2 with 10 $\mu$ M PD98059 or 5 $\mu$ M U0126. Specific, dual phosphorylation of p38 MAP kinase or ERK-1/2 on their activation sites was detected by western blotting. Dynamics of GFP-actin and VE-cadherin-GFP expressed in HUVEC were also evaluated. The results show that histamine increased phosphorylation in both p38 MAP kinase and ERK-1/2, which was blocked by pretreatment with SB203580, or PD98059/U0126, respectively. Histamine-induced decreases in TER were inhibited by SB203580, but not affected by PD98059 or U0126 pretreatments. Histamine did not change VE-cadherin-GFP organization, but did briefly stop GFP-actin-rich edge protrusions. However, these protrusions were not decreased by histamine when the cells were pretreated with SB203580. The data suggest that p38 MAP kinase, but not ERK-1/2, mediates histamine-induced endothelial barrier disruption by reducing endothelial cell spreading motions. (*Supported by NIH grants R01HL098215 and P20GM103424, NSF grants HRD0928797, Louisiana Board of Regents Support Fund*).

## II Prize Winner

### ***Effect of Maize Mosaic Rhabdovirus on the Behavior of the Planthopper Vector, *Peregrinus maidis****

**Tiffany Glover**<sup>1</sup>, Karen B. Alviar<sup>2</sup>, Anna E. Whitfield<sup>2,1</sup>  
Department of Biology, Langston University, Langston, OK; <sup>2</sup>Department of Plant pathology, Kansas State University, Manhattan, KS.

Arthropod vectors play an essential role in dissemination of viruses that cause diseases in humans, animals, and plants. More than 70% of viruses infecting plants and 40% of viruses infecting mammals are transmitted from one host to another by arthropod vectors. In some cases, the arthropod serves as a host as well by supporting virus replication. The objective of this work was to determine the effect of a virus, Maize mosaic rhabdovirus (MMV), on the fitness and behavior of the vector, *Peregrinus maidis*. Rhabdovirus infection has been shown to increase biting rates and impact host fitness in other animal and insect pathosystems. We hypothesized that MMV would significantly impact vector fecundity, longevity and feeding behavior. To determine the effect of virus infection on fecundity, the egg production of MMV-exposed and non-exposed insects was measured at 3, 7 and 14 days after mating. The two treatments showed no significant difference in the numbers of eggs produced indicating that MMV did not alter fecundity. The longevity of MMV-exposed and healthy insects was compared and there was no difference in the survival of insects. To determine the effect of MMV infection on feeding behavior, we measured the number of salivary sheaths produced by insects. We found that MMV-exposed females produced significantly more salivary sheaths than non-exposed females. This finding suggests that MMV infection alters female feeding behavior. Overall, MMV infection does not reduce vector fitness but virus-induced changes in vector feeding behavior may promote transmission. (*K-INBRE and NSF grant IOS-953786 funded this project*).

## III Prize Winner

### ***The Effects of TGF- $\beta$ 2 and Activin A on the Expression of Extracellular Matrix Proteins in Human Trabecular Meshwork Cells***

**Ashley S. Hurst**<sup>1</sup>, Ashley M. Fitzgerald<sup>2</sup>, Andrew Fisher<sup>2</sup>, Abe F. Clark<sup>2</sup>, Robert J. Wordinger<sup>2</sup>.  
<sup>1</sup>Department of Natural Sciences, Biology Unit,

Southern University and A&M College, Baton Rouge, LA; Department of Cell Biology and Anatomy, NTERI, University of North Texas Health Science Center, Fort Worth, TX.

Primary open angle glaucoma (POAG) is a leading cause of blindness affecting 70 million people worldwide. The major risk factor for developing POAG is elevated intraocular pressure (IOP) resulting from increased resistance of aqueous humor outflow through the trabecular meshwork (TM). Bone morphogenic protein-4 (BMP-4) blocks TGF- $\beta$ 2 induced extracellular matrix (ECM) deposition in TM cells. Follistatin (FST) and gremlin are BMP antagonists that block BMP-4 inhibitory effects. FST is also known for its inhibitory effects on activins (Acts). Information is lacking about the function of FST and Acts, in TM cells. In addition, STC-1 may be a key mediator of BMP-4 inhibition of TGF- $\beta$ 2 in human TM cells. The purpose of this study was to determine 1) the effect of Act-A on the expression of ECM genes and proteins and 2) if STC-1 protein is present in cultured TM cells. TM cells were cultured and treated with Act-A at a concentration of 50ng/ml for 3, 6, 12, 24, 48, and 72 hrs. QRT-PCR was used to determine Act-A effects on mRNA expression of ECM genes fibronectin (FN), PAI-1, and Collagen 1 in human HTM5 and GTM3 cells. Western immunoblot analysis was used to evaluate Act-A effects on ECM proteins FN, PAI-1, and Collagen 1. TM cells were also cultured with TGF- $\beta$ 2 (5ng/ml), BMP-4 (10 ng/ml) and/or gremlin (1ug/ml) for 48hrs. Western immunoblot analysis was subsequently used to evaluate protein expression for STC-1 in TM cells. Act-A increased mRNA expression and protein levels of FN, PAI-1, and Collagen 1 in human cultured TM cells. Protein expression of STC-1 was down-regulated by TGF- $\beta$ 2 and up-regulated by BMP-4 in TM cells. This is the first report of Act-A induction of FN, PAI-1, and Collagen 1 in human cultured TM cells. We have also identified STC-1, a potential mediator in BMP4 attenuation of TGF- $\beta$ 2 induced ECM deposition, in human cultured TM cells. The involvement of Act-A in the increase of ECM proteins may identify another key mediator in ECM remodeling in glaucoma pathology. The identification of STC-1 in TM cells may be of importance in BMP-4 regulation of TGF- $\beta$ 2. (*This research is funded by U.S. Dept. of Education, McNair: P217A0300 to Dr. Kaman*).

## Biology-C

## I Prize Winner

***Using Waist Circumference as a Biomarker for Insulin Resistance in the Eastern Cape***

Sara Nelson-Owens<sup>1</sup>, Keratiloe Gwebu<sup>2</sup>, Malcolm Cort<sup>3</sup>, Constance Rusike<sup>4</sup>, Ephraim Gwebu<sup>5</sup>.

<sup>1</sup>Department of Biology, Norfolk State University, Norfolk, VA; <sup>2</sup>Nursing Department, Tidewater Community College, Norfolk, VA; <sup>3</sup>Department of Sociology, Athens State University, Athens, AL; <sup>4</sup>Department of Physiology, Walter Sisulu University, Mthatha, Eastern Cape, South Africa; <sup>5</sup>Department of Chemistry, Geology and Physics, Elizabeth City State University, Elizabeth City, NC.

In an insulin resistant state, cells are desensitized to the uptake of insulin, therefore resulting in increased glucose and insulin levels in the blood; therefore, Insulin resistance is an identifiable precursor to developing Diabetes mellitus. Diabetes affects more than six million people in the country of South Africa. Unfortunately the cost of diagnosis and treatment is expensive and much of the material needed is not available. An accurate, inexpensive pre-diagnostic method is needed in rural South Africa. Waist circumference has been associated with insulin resistance in other populations and was explored in South Africa to determine that a large waist circumference may be a predictor of insulin resistance. Demographic information including waist circumference and blood samples were collected from volunteer patients in the Walter Sisulu University NMD Campus Clinic. Components of the blood were allowed to separate and the serum was collected from each sample. The insulin levels in the serum were quantified using Enzyme Linked Immunosorbent Assay (ELISA). Homeostasis model assessment of Insulin Resistance (HOMA-IR) was used to quantify insulin resistance. Statistical package for the social sciences (SPSS) was used to create correlations between observed variables: waist circumference, insulin levels, and HOMA-IR. Results indicate that as waist circumference increases, insulin levels increase among men but not among women. HOMA-IR values also increase as waist circumferences increase among men; however there is not a significant difference among women. With the collection of additional data, yielding a larger sample size, we expect to see a significant correlation between waist circumference, insulin values, and HOMA-IR values among men and women. We can then hypothesize that a large waist circumference will

be a predictor of insulin resistance in the Eastern Cape of South Africa. (*This research was funded by NCHMD/NIH Grant # 1 T37 MD 001810-08*).

## II Prize Winner

***Construction of Novel Hybrid Proteins For Characterization of OMP Assembly In E. coli***

Samuel Owusu-Mireku<sup>1</sup>, Dante Ricci<sup>2</sup>, Tom Silhavy<sup>2</sup>. <sup>1</sup>Department of Biology, Indiana University, Bloomington, IN; <sup>2</sup>Department of Molecular Biology, Princeton University, Princeton, NJ.

Outer membrane proteins (OMPs) are an essential part of the outer membrane (OM) of Gram-negative bacteria. The Bam complex (BamA, BamB, BamC, BamD and BamE) is an ancient machine that is crucial to the survival of every organism with an OM. BamA is required for protein assembly; however, our understanding of it is very limited. BamA is a bipartite protein that contains a soluble periplasm domain and an integral OM Beta-barrel domain. The Beta-barrel domain of BamA is conserved from bacteria to humans, yet the function of this domain is not well understood. We sought to characterize the function of the Beta-barrel domain by fusing heterologous Beta-barrel domains to the periplasmic domain of *Escherichia coli* BamA. We have identified homologs of BamA in diverse Gram-negative bacteria including *Salmonella enteritidis*, *Acinetobacter baumannii*, *Caulobacter crescentus*, and *Neisseria gonorrhoeae*. In addition, we seek to fuse the periplasmic domain of *E. coli* BamA to the Beta-barrel domain of YtfM, a BamA paralogue that does not participate in OMP assembly. We will use these novel hybrid proteins to determine: (i) whether the Beta-Barrel domain catalyzes some generic conserved function across all species; (ii) whether it makes non-covalent contacts with the periplasmic domain; and (iii) whether portions of the Beta-barrel are involved in the maintenance of the physical Bam complex. We predict that these hybrid proteins will be useful in determining the primitive function of BamA, and determining the way in which diverse bacterial species have adapted the Bam machine to accommodate species-specific substrates.

### Joint III Prize Winners

#### ***Revealing the Components of the Cgi Regulatory System of Complementary Chromatic Acclimation in *Fremyella Diplosiphon****

**Terry Philips**<sup>1</sup>, Lisa Wiltbank<sup>2</sup>, LaDonna Jones<sup>2</sup>, David M. Kehoe<sup>2</sup>. <sup>1</sup>Department of Biology, Langston University, Langston, OK; <sup>2</sup>Department of Biology Indiana University, Bloomington, IN.

As a country, America is heavily dependent on the use of fossil fuels for energy. These fuels are an unreliable source of energy because there are nonrenewable and depleting quickly. Moreover, the burning of these fuels release large amounts of CO<sub>2</sub>. Thus, there is a need to find a healthier, more sustainable way to produce energy. Bio solar energy production is one alternative energy source being researched. Knowledge about how photosynthetic organisms capture and use the sun's energy is important to bio solar energy research. The freshwater cyanobacteria, *Fremyella diplosiphon*, has a complex photosynthetic control system that changes specific protein amounts in order to optimally absorb and use the light color in its environment to produce energy for photosynthesis. This process is known as Complementary Chromatic Adaptation (CCA). CCA entails a change in gene expression that was thought to be regulated only by the Rca system.. The aim of this experimentation was to begin to elucidate components of the Cgi system for future investigations. Knowing the components of this regulatory system will allow us to create artificial bacteria with genes capable of harvesting light energy for human resources. We conducted a mutant screen to find components of the Cgi system by using a transposon mutagenesis of cells lacking Rca system. The site of DNA transposon insertion was evaluated from four brown mutants of *F. diplosiphon* to determine the genes responsible for phycoerythrin (PE) regulation.

#### ***The Effect of Clonal Diversity on Rates of Adaptation***

**Shonkela Pittman**<sup>1</sup>, Barry Williams<sup>2</sup>. <sup>1</sup>Department of Biology, North Carolina A and T State University, Greensboro, NC; <sup>2</sup> Department of Zoology, Michigan State University, East Lansing, MI.

The genetic basis of adaptation for asexual organisms is complex because mutations altering the fitness of one clone will 'compete' against mutations from other

clones, because recombination does not combine mutations together within one genome, and is termed clonal interference. Moreover, clonal interference among clones that harbor otherwise homogeneous genomes, may be further complicated by competition among unrelated clones, which occurs during infections with heterogeneous populations of pathogens. However, little is known about the potential interactions between clonal interference and competition. The focus of this experiment is to determine if increasing competition among a diversity of asexual microbes alters rates of adaptation. Here we developed natural haploid strains of *Saccharomyces cerevisiae* that were isolated from three ecological conditions, and are thus unrelated. We evolved various combinations of related versus unrelated strains asexually in one novel environmental condition. Fluorescent markers were used to visualize the relative abundance of each strain within the evolving populations in order to determine the degree of clonal interference. Growth rates in the evolved populations, relative to the starting ancestor, were determined in order to compare rates of adaptation among treatments. Prospective differences in rates of adaptation will help elucidate the dynamics of host adaptation in cases of multiple-strain infections.

## Biology-D

### I Prize Winner

#### ***Gene Expression Changes in the Visual Centers of the Brain In Balb/Cj Mice after Optic Nerve Crush Associated Trauma***

**Augusta Robinson**<sup>1</sup>, T. Putliwala<sup>2</sup>, Abbot F. Clark<sup>2</sup>. <sup>1</sup>Department of Natural Sciences, Biology Unit, Southern University and A&M College, Baton Rouge, LA. <sup>2</sup>Department of Integrative Physiology, University of North Texas Health Science Center, Fort Worth, TX.

The purpose of this study was to evaluate changes in superior colliculus gene expression using an in vivo optic nerve crush (ONC) mouse model that mimics many features of glaucoma axonopathy. Unilateral ONC was performed on BALB/cJ eyes using the Nickell's technique. Superior Colliculus (N=5) harvested at six different time points post crush. Pooled RNA samples (N=5/ time point) were run on Affymetrix Mouse Gene array chips. DAVID databases were used for bioinformatics analysis to form temporal expression clusters. After ONC, gene expression was significantly and temporally altered ( $p < 0.05$ , fold change of 1.5) in

22 up-regulated gene clusters and 29 down-regulated clusters, based on the three gene ontologies. Early up-regulated gene clusters at 3 and 7 days included regulation of transcription, T-cell mediated immunity, extracellular region, and zinc ion binding, while later time points included neuron projection and differentiation and sensory eye development. Down-regulated clusters at early time points included immune response and regulation of apoptosis. The later time points showed the categories of immune processes as well as cytoskeleton and positive regulation of developmental process. Key genes in both datasets included NEUROD4, SNCG, and TCFAP2B. qRT-PCR confirmed expression of these genes. Our findings will be a crucial source of information in the development of therapeutic strategies to prevent the loss of visual function and assist in neuron regeneration after optic nerve axonopathy.

## II Prize Winner

### ***The Toxicity of Tire Leachates to *Girardia tigrina* is Due to Zinc Content***

**Elliot Rice**, Rosie Sneed. Department of Biology, Chemistry, and Physics, University of the District of Columbia, Washington, DC.

Recycling used tires into playground surfaces and landfill liners poses the risk of tire components moving into local watersheds and affecting aquatic organisms. In this study we tested the hypothesis that the zinc content of tire leachate is a significant factor in its toxicity to *Girardia tigrina* (Girard, 1850), a freshwater planarian common to North American waterways. Planarians were cultured in tire leachate containing either 49.5 mg/L of zinc (BALT) or 0.13 mg/L (FRESH) of zinc or a control [extraction medium (EM)] over a 24 hour time period. All planarians cultured in BALT died within 24 hours while no planarians died in the other groups. To verify zinc as the causative agent in the observed toxicity, planarians were maintained in a solution containing an equivalent amount of zinc (from zinc sulfate) for 24 hours. To rule out the role of sulfate, a control group of *G. tigrina* was cultured in magnesium sulfate with sulfate levels equal to that of zinc sulfate. The survival rate of planarians in the zinc sulfate-treated group did not significantly differ from the survival rate observed in the BALT group and increased levels of magnesium sulfate had no effect. These data indicate zinc as the toxic agent. In addition to the lethality demonstrated by both high-zinc solutions, planarians displayed signs of neurotoxicity, indicated by loss of motor coordination. Future studies will examine the dose-response relationship of zinc toxicity in *G.*

*tigrina* as well as evidence of neurotoxicity. [Supported by UDC NIH/NIGMS MARC (5 T34 GM087172-03)].

## III Prize Winner

### ***Understanding Gene Expression during the Interaction Between a Biocontrol Bacterium and a Fungal Rice Pathogen***

**Bianca L. Riddick**<sup>1</sup>, <sup>2</sup>Nicole M. Donofrio. <sup>1</sup>Department of Biology, Norfolk State University, Norfolk, VA; <sup>2</sup>Department of Plant and Soil Sciences, University of Delaware, Dover, DE.

*Magnaporthe oryzae* is the most devastating fungal pathogen of rice, and is a filamentous ascomycete fungus that causes rice blast disease. *M. oryzae* is known for infecting plants such as barley and wheat but perhaps most importantly, rice. It kills enough rice to feed 60 million people annually. In the experiments presented here, the bacterium *Lysobacter enzymogenes* is being studied as a potential biocontrol against *M. oryzae*. *L. enzymogenes* is a bacterial antagonist of fungal pathogens via lytic enzymes, antibiotics and the induction of plant resistance. We used three different strains of *Lysobacter*, C3, DCA, and Type IV. The latter two are mutated in their ability to antagonize fungi, while C3 is the wild type strain and parasitizes the fungus within ~24 hours, attaching within 3 hours. The interaction between *M. oryzae* and *L. enzymogenes* is important because in this study we are trying to determine what fungal genes are working during bacterial attack. Understanding how the fungus is fighting against the bacterium, and/or preparing itself for bacterial attack, could provide clues on how to best use this biocontrol bacterium. What genes are turned on in the presence of these particular strains? Is the fungus defending itself in any way? We have found that the CFEM domain containing gene *pth11*, is potentially important in fighting the bacteria.

Computer Science/  
Mathematics/Physics/Earth  
Science/Environmental  
Science-A

**I Prize Winner**

***Implementation of a Wireless Body Area Network for Healthcare Monitoring***

**Ashenafi Lambebo**, Lalindra Jayatilleke, Aime V. Mbakop, Ayele Feleke, Araya Sasan Haghani. Department of Electrical and Computer Engineering, University of the District of Columbia, Washington DC.

The rapid growth of wireless technologies and personal area networks has enabled the continuous healthcare monitoring of mobile patients using compact sensors that collect and evaluate body parameters and movements. These sensors constitute a body area network (BAN) where patients' vital signs are collected and reported wirelessly to a base station. Once the data is received, it is displayed or stored in a database for future use. The use of BANs is to provide the users with logging of patients' critical vital signs, and also to provide primary healthcare providers a snapshot of the wearer's health. The goal of this project was to investigate the feasibility of the inexpensive construction, and use of a BAN. A BAN, consisting of two nodes and a base station was successfully built and tested using open source and inexpensive hardware to measure pulse rate body temperature and patient's location. Each node consisted of a pulse sensor, a temperature sensor, a GPS module and a Zigbee wireless modem packaged together. The nodes were designed to incorporate other sensors, such as an accelerometer, in the future. The base station consisted of a receiving Zigbee modem and a Wi-Fi module. The captured data was inserted into a MySQL database where a webpage with a graphing application programming interface (API) was used to display the data. The system has been successfully tested in real time where data was successfully obtained and displayed. Future enhancements to safeguard the data, including the encryption of the patient data is under investigation.

**II Prize winner**

***Precipitation Analysis for Mid-Atlantic Region Based on Storm Event Analysis***

**Asteway Ribisso**, Pradeep Behera. Department of Engineering, Architecture and Aerospace Technology, University of the District of Columbia, Washington, DC.

Since the publication of the Intergovernmental Panel on Climate Change documents, there has been a growing interests among scientists, engineers, governments and public to understand climate change issues and its associated impacts. Climate change and water resources management are closely related because climate change affects the hydrologic cycle directly. The potential climate change can have significant impacts on our water resources and related sectors such as water availability, flooding, urban infrastructures, water quality, ecosystems, coastal areas navigation, hydropower, economy and other energy. To understand and in support of informed decision for adaptation climate change related issues, this research proposes to conduct a technical analysis of the long-term point rainfall data for determining the potential climate change trend. Available long-term hourly rainfall records within the Mid- Atlantic Region are divided chronologically into lengths of 20-30 year of segments. For each of the time segments, storm event analyses were conducted for many locations within the Region. Storm event analysis were conducted based on the inter event time definition (IETD). The statistical characteristics of storm event characteristics (i.e., event volume, event duration, average intensity and inter event time) were obtained for each time period. A comparative analysis of design storm event volumes for various durations and storm event analysis for varying IETDS were conducted. The preliminary result of this ongoing study is presented. Such information is very critical for our water resources professionals, engineers and regulatory authorities in evaluating the existing urban drainage infrastructures and future hydrologic analysis and storm water management.

**III Prize Winner**

***How a Computer Virus Infiltrates a Computer System in Reference to a Biological Virus in the Human Body***

**Dallas Ellis III**<sup>1</sup>, Jessy Beach<sup>1</sup>, Phylicia Polk<sup>2</sup>, Angelyn Flowers<sup>3</sup>. <sup>1</sup>Department of Computer Science, Norfolk State University, Norfolk, VA; <sup>2</sup>Hampton University, Hampton, VA; <sup>3</sup>Department of Urban Affairs, Social Sciences and Social Work, University of the District of Columbia, Washington, DC.

This research project investigates how computer viruses infiltrate a computer system and spread throughout a

network of interconnected computers. It also analyzed the similarities of a biological virus entering a human body system, and the defenses the immune system takes in stopping the virus in comparison to an anti-virus system with a computer virus. The main question for this research is, "What is Cyber Security?" Computer security is not just about technology and systems. It is also about the people that use those systems and how their vulnerable behaviors can lead to exploitation. Results of the experiments conducted at The University of the District of Columbia and the system used to conduct the experiments are presented to show how computers in domestic use and on larger network use are interconnected. Using NetLogo (a programmable modeling environment for simulating natural and social phenomena), the spread of a computer virus was simulated. These ever expanding networks of computers are easy travel grounds for viruses to spread at rapid rates. This leaves personal accounts, money transactions and top secret information susceptible to potential cyber threats. Worldwide communication has evolved more in the past 10 years than in the last 100 years alone. With the accessibility of such online media as email, Facebook, Twitter, MySpace and eHarmony; it is possible to communicate and share information with people in several different countries within seconds. With this global phenomenon comes the realization of cyber threats and crime. It is important to understand the different types of computer viruses and how they infiltrate computer systems and networks. The importance of this research is to compare the model processes of computer and biological viruses and how they infiltrate their perspective systems, and to understand the importance of cyber security measures in today's global world. The field of computer and information security requires the foundational science that provides the means for assessing the strength of organizational security postures. For the Dept. of Homeland Security needs, solid metrics may be applied as a means of assessing the strength of one organization relative to others, and to help identify vulnerabilities. Computer Security is not just about technology and system, but must also take into consideration the people and processes that rely on the systems. Traditional training techniques such as warnings about scams, can be beneficial but are not enough. Better defense approaches are being advocated to help today's ever growing cyber world. [This study was supported, in part, by a grant from The Department of Homeland Security, awarded to Angelyn Flowers Ph.D., Director for the Department of Criminal Justice, University of the District of Columbia, Washington, DC 20008].

## Computer Science/ Mathematics/Physics/Earth Science/Environmental Science-B

### I Prize Winner

#### *Data Encryption and Decryption*

**Gino P. Loverde**, Rispah C. Sang, Delin Tan.  
Department of Mathematics, Southern University at  
New Orleans, New Orleans, LA.

From Ancient Mesopotamian ciphers to the Enigma Machine of World War II era Germany, the ability to securely code and decode messages has been a powerful, world changing tool. Technological advancements have created a need for more efficient and ever more complex ways of coding information. Data encryption is common throughout one's home network, online banking experiences, and other websites that use secure servers. The purpose of this research is to analyze the process of securely encoding and decoding data via three different methods: matrix multiplication, power operation, and public key RSA (an encryption algorithm named for its three originators). Matrix multiplication invokes several elements of linear algebra and number theory including properties of inverse matrices, inspecting the determinant, modulus operator in Ring  $Z_{27}$ , and checks for coprimality. In the power operation, we use Eulers' Theorem, for any integer  $x$ :  $1 < x < p$

$$(x^e)^d = x^{1+k(p-1)} = x(x^{p-1})^k = x \pmod{p}$$

If  $x$  is the original data, then  $m = x^e \pmod{p}$  is the encrypted data, and  $m^d \pmod{p}$  is the decrypted data. RSA encryption also uses Eulers' Theorem. However, we used two large prime numbers  $p$  and  $q$  and look for  $e$  and  $d$  such that  $e \cdot d = 1 \pmod{(p-1)(q-1)}$ . Programming was completed using Matlab 7.5.0 (R2007b) or GNU Octave 3.2.4. The result of this programming allowed us to develop a Graphical User Interface (GUI) capable of coding and decoding user supplied data. We conclude that as the need for data security becomes ever more pervasive in our daily lives, advancing its complexity will employ increasingly intricate mathematics. Further research work will be concentrated in developing a window project, which can send encrypted email data and complete decryption by certain methods. This future programming project will be a combination of



MATLAB and Microsoft Dot Net, requiring the creation of a Dot Net Dynamic Link Library (DLL) from MATLAB and applying it to the Dot Net program. *This research was completed with funding from the National Science Foundation (HRD-0928797).*

### Joint II Prize Winners

#### **Performance Indicators for Elementary & Middle School Students**

**Amber D'Ashly Dillon**, Rachid Belmasrou.  
Department of Mathematics, Southern University at New Orleans, New Orleans, LA.

The objective of this research is to study the performance indicators for elementary and middle school students and what activities enable children to do better. Chi-Square, ANOVA, and Fisher's LSD were implemented to find out what is necessary in order for the child to succeed. The National Center for Education Statistical (NCES) is the primary federal for collecting, analyzing and reporting data related to education in the United States and other nations. This data presents non parental care arrangement for example: care by relative, care by persons to whom they were not related, participation in day care centers, Educational programs of infants and preschool children, preschool program. The weighted unit response rate was 84.4 percent. This research indicated that achievement is not independent of gender, there was no difference between the student's grade and who takes care of the child after school, and that there was significant difference in performance due to advising. *This research is supported in part by NSF (HRD – 0928797).*

#### **A Computational Study of Gamma Parameter Estimates and Estimation of a System's Reliability Based on a Component-Wise Gamma Model**

**Dot'toya Jones**<sup>1</sup>, Rasheen Alexander<sup>2</sup>, Borang Touch<sup>2</sup>, Jasmine Wallace<sup>2</sup>, Tracy Wilson<sup>2</sup>, Jessie Castille<sup>2</sup>, Nabendu Pal<sup>2</sup>. <sup>1</sup>Department of Mathematics, Southern University at New Orleans, New Orleans, LA; <sup>2</sup>Department Of Mathematics, University of Louisiana at Lafayette, Lafayette, LA.

Assuming a two parameter gamma distribution to model the lifetime of system components we first study the sampling distribution of the maximum likelihood estimates of the gamma parameters. Existing literature provides some useful results about the bias and MSE

of the gamma parameter estimates. But in this study we go into further depth in studying the nature of the sampling distributions of the parameter estimates. First, we studied the sampling distributions of the parameter estimates. Then, we studied the sampling distribution of the estimate of the reliability of a system, for both single component as well as multi-component series and parallel systems. *(This work is a part of the undergraduate summer research and professional development experience, organized by the University of Louisiana at Lafayette, called "Smooth Transition for Advancement to Graduate Education" (STAGE) for Under-represented Minorities (URM) in Mathematical Sciences. STAGE is a Pilot Project supported by the National Science Foundation under the grant DMS-1043223).*

#### **Signal and Image Denoising by Fourier Analysis in MATLAB**

**Rispah C. Sang**, Gino P. Loverde, Delin Tan.  
Department of Mathematics, Southern University at New Orleans, New Orleans, LA.

We are currently immersed in the *Digital Data Era*. Most data is in digital format, such as digital medical signals, digital imagery, digital music and digital movies. However, the digital data could be perturbed by unwanted noise. An important topic in numerical research focuses on how to suppress enough noise and recover as much of the original digital data as possible. Fourier Transformation is an important mathematical tool that is used in many areas of science and engineering. This research focuses on how to use the Fourier Transformation to remove the noise from one dimensional signal and two dimensional images. From Fourier Transformation theory, any spatial data can be decomposed into frequency data. We also know that what we refer to as noise occurs in areas of high frequency. Therefore we can use the following steps to remove the noise: Step 1: Apply 1D or 2D Fourier Transformation to the signal containing noise or image data to get their frequency distributions in the Fourier Domain; Step 2: Design a 1D and 2D filter in Fourier domain, which are normal distributions with maximum value of one and zero for the high frequencies; Step 3: Multiply such filters to the noised data in Fourier domain; Step 4: Apply the inverse Fourier Transformation to the product to get the noiseless data. For the color image, we need to do so for each color component. All of the above operations are performed in MATLAB. After those steps, we can see that most of the noise is gone and the original data is mostly recovered. Although,

some high frequency data in the original signal or image is also gone, however the outcome seems acceptable. In the future, we intend to look at how we can combine a process of several transformations through Matlab and Mathematica programming that can create increasingly higher quality imagery. *This research was completed with funding from the National Science Foundation (HRD-0928797).*

## Psychology/Science Education/Social Sciences-A

### I Prize Winner

#### ***Effect of Worldview on African American Self-consciousness and Cultural Misorientation***

**Kristen Broussard**, Reginald Rackley. Department of Psychology, Southern University and A&M College, Baton Rouge, LA.

An experiment was conducted to determine the effect of worldview on African self-consciousness and cultural misorientation among African American College Students. Participants were fifty male and female African American college students at a college in the South. Participants were given a battery of tests to determine their worldview and their levels of African self-consciousness and cultural misorientation. The experimental group was exposed to a film on cultural misorientation and the control group was not. The results showed that participants with high levels of African self-consciousness had higher levels of worldview (African worldview) than participants with low levels of African self-consciousness; males were more culturally misoriented than females; African American college students who had an African Worldview orientation had higher levels of African Self-Consciousness than African American college students who have a European Worldview orientation; females has higher levels of African Self-Consciousness than males; the experimental group of females had higher levels of African Self-Consciousness than the experimental group of males; and females who have taken two or more black studies courses had higher levels of African Self-Consciousness than males who had not taken black studies courses. Therefore, the implication of more required black studies courses for students would lead to students developing higher levels of African self-consciousness. Requiring athletes and prospectus members of fraternities to take a minimum of one Black

Experience course along with one or more courses on African/African-American History would lead to an increase in the levels of African self-consciousness among African American male students.

### II Prize Winner

#### ***Correlations Between Self-Identity and Product Vehicles***

**Charity Fonkeng**. Department of Psychology, Fisk University, Nashville, TN.

The principles of symbolic interaction have served to guide several research studies within marketing and consumer behavior literature. Researchers have long sought insight into the question, "How does the "self" interact with consumer buying habits?" To what extent do humans purchase goods that in some way enhance or compliment their perceptions of self? Studies range in their capacities to determine if such a relationship exists, while others expand to determine which aspect of the "self", the actual or the ideal, is of greater importance in explaining consumer behavior patterns. Because of the complexities of gender identity and its measurements, this paper will explore gendered identities as measured by gender role attitudes as they may be a better indication of the impact of gender upon consumer buying behavior. Surveys of college students in the South reveal mixed results of correlations between self-identity and product vehicles. Results showed that sex had no significant effect upon the perceptions of four vehicle personalities.

### III Prize Winner

#### ***Education: The Civil Rights Issue of Our Time***

**John Pierre Lafleur**, Deborah Clark. Southern University and A&M College, Baton Rouge, LA.

Access to education is the most important civil rights issue of today. While most Americans equate civil rights with the traditional struggle for racial equality, the right to pursue educational goals has emerged as the new battlefield of equality. The efforts of Martin Luther King, Jr. and the traditional struggle for racial equality come to many people's minds when asked about civil rights. When one thinks of the civil rights movement of the 1960s, the images that come to mind are the marches, the dogs, the police, the Klan and the singing. Education and access to it is the single biggest issue facing Americans. If every child actually had the same

right to an education, then a lot of the other statistics that show minorities [leading in] arrest rates or [the] number of people living below the poverty line would most likely decline. "Education 'creates the "voice" through which rights can be claimed and protected', and without education people lack the capacity to 'achieve valuable functioning as part of the living'. If people have access to education they can develop the skills, capacity and confidence to secure other rights. Education gives people the ability to access information detailing the range of rights that they hold, and government's obligations."

### Chemistry-A

#### I Prize Winner

##### **Synthesis and Structure Characterization of an Ionic Tributyltin Complex with Oxalic Acid**

**Andrei Callejas**, Dain Thorpe, Woldegebriel Yeibyo, Xueqing Song, Department of Biology, Chemistry and Physics, University of the District of Columbia, Washington, DC.

There is a large need for the development of novel metal-based anticancer agents due to the low solubility and high organ toxicity of metal-based compounds such as cisplatin and its analogues. Triorganotins have been well established as having various biological activities including anticancer activity. However, their low solubilities in water may have limited their effectiveness. On the other hand, ionic triorganotin complexes may have improved solubilities due to their partially ionic characteristics. Our hypothesis is that ionic triorganotin derivatives will have better solubility and better activity as potential anticancer agents with reduced toxicity. Synthesis of the ionic tributyltin complexes involve the reaction of oxalic acid, a diprotic carboxylic acid, with bis(tributyltin) oxide in the presence of dibutylamine. One carboxyl group in oxalic acid forms a tributyltin ester with bis(tributyltin) oxide by removing a water molecule through a condensation reaction, while the other carboxyl group reacts with the diamine to form an ammonium salt of the carboxylate. A polymeric ionic tributyltin complex with four Tin nuclei in the repeating monomeric unit was obtained from the synthesis with dibutylamine. The structure of this complex was characterized by Infrared and  $^1\text{H}/^{13}\text{C}/^{119}\text{Sn}$  NMR spectroscopies. There are three oxalate groups involved in the coordination to four tributyltin groups. The ionic complex consists of two anionic moieties and two dibutylammonium as the counterions. All tin atoms in the complex have the common trans-trigonal

bipyramidal geometry with three butyl groups in the equatorial plane and two O atoms at axial position. Both short and long tin-oxygen distances are observed for all tin atoms in the complexes. The results indicate ionic tributyltin complexes can be successfully obtained in a condensation reaction of bis(tributyltin) oxide with a diprotic oxalic acid in the presence of an organic amine. Future studies will be focused on a relationship between aqueous solubility and biological activity. [This study was supported by a grant from NIH/NIGMS – grant# 1T34GM087172-01A1 - awarded to the MARC U\*STAR program, University of the District of Columbia, Washington, DC 20008.]

#### Joint II Prize Winners

##### **Synthesis of a NiSOD Analogue**

**Nehemiah Ceasar**<sup>1</sup>, Phan Troung<sup>2</sup>, Toded Harrop<sup>2</sup>. Fort Valley State University, Fort Valley, GA; Department of Chemistry, University of Georgia, Athens, GA.

This project investigated the limits of a region on chicken chromosome 3 that displays unusual, non-Mendelian inheritance. Our laboratory became interested in this region because it appeared to possibly be related to sperm mobility phenotype. The region contains the ARMC2 gene which is expressed in testes. Previously in our laboratory, Joshua Blaylock, had used PCR-sequencing to investigate inheritance of several Single Nucleotide Polymorphisms (SNPs) in the ARMC2 gene in selected families segregating for sperm mobility phenotype. His results indicated that the SNPs were not being inherited in a Mendelian fashion. Specifically, he found that for individual SNP locations the SNP allele from either the father or the mother could be lost in about half of the male offspring, while half appeared to get alleles from both parents. Joshua had observed this non-Mendelian inheritance for nearly the entire 56,000 bases of the ARMC2.

##### **Evaluation of Apoptosis and Autophagy Induced by novel mTOR and Proteasome Inhibitors in Human Renal Angiomyolipoma Cells**

**Annie P. Clark**<sup>1</sup>, L. Lu<sup>2</sup>, A. Nicole White<sup>3</sup>, Brian J. Siroky<sup>2</sup>, John J. Bissler<sup>2</sup>. <sup>1</sup>Department of Chemistry, Southern University A&M College Baton Rouge LA; <sup>2</sup>Division of Nephrology and Hypertension, Cincinnati Children's Hospital Medical Center, Cincinnati, OH; <sup>3</sup>The Division of Rheumatology, Cincinnati Children's Hospital Medical Center, Cincinnati, OH.

Tuberous Sclerosis Complex is a tumor predisposition syndrome caused by mutations in *TSC1* or *TSC2*, which causes derangements in mammalian target of rapamycin (mTOR) activity, and leads to formation of angiomyolipomas (AML). Our laboratory previously discovered that *TSC2*-deficient human renal AML cells were more sensitive to the proteasome inhibitor MG-132 compared to *TSC2*-rescued cells, and that autophagy may enhance this effect. We postulated that MLN2238, a novel proteasome inhibitor, would kill *TSC2*-deficient AML cells more effectively than *TSC2*-rescued cells. Also, the novel mTOR inhibitor Torin2, which is thought to more effectively induce autophagy compared to other mTOR inhibitors, would enhance this effect. In this study, we measured cell viability by utilizing the crystal violet assay, and used western blot and ImageStream X image-based flow cytometry to evaluate apoptosis and autophagy. Viability assays and western blotting indicated that *TSC2*-deficient cells were more sensitive to MLN2238 compared to *TSC2*-rescued cells. mTOR inhibition combined with MLN2238 was more effective at reducing cell viability than either treatment alone. However, established by western blot, MLN2238 alone showed the greatest induction of apoptotic markers. Also based on western blot, Torin2 appears to more effectively induce autophagy compared to another mTOR inhibitor, RAD001 – alone or combined with MLN2238. Curiously, ImageStream X findings showed reduced autophagy occurring with combined Torin2 and MLN2238 compared to Torin2 alone. Our results suggest that MLN2238 along with Torin2 shows promise as a targeted therapy for TSC associated AMLs. However, additional studies are required to thoroughly evaluate these observations. (This work was supported by the 2012 Cincinnati Children's Hospital Medical Center Summer Undergraduate Research Program (SURF).

## Chemistry-B

### I Prize Winner

***Regiospecific Lithium-Mediated  $S_N2$  Benzylolation of a Natural Anthraquinonoid Dye: Producing Eco-Friendly Dye for Eco-Friendly Fabric***

**Rajah Singh**<sup>1</sup>, George John<sup>2</sup>, Julian Silverman<sup>2</sup>.

<sup>1</sup>Department of Chemistry, Langston University, Langston, OK; <sup>2</sup>Department of Chemistry, City College of New York, New York City, NY.

Polylactic acid (PLA) fiber is a new sustainable ecological fiber. In addition to being thermoplastic and

produced in less time from renewable resources, PLA shows mechanical behavior comparable to Polyester and Nylon. Research shows that dyes containing additional –OR groups have better sorption onto certain fabrics. Other fabrics, like PLA, do not retain these dyes. The anthraquinonoid purpurin is a natural more polar red dye not retained on PLA. The sorption of hydrophobic dyes onto biodegradable synthetic fabrics can be improved by substituting non-polar groups for more polar groups. This study aimed to achieve efficient production of a mono di-ether purpurin product. We hypothesized that a general reaction mixture with added lithium will produce a regiospecific product, an ether linkage solely on the 2-position. The product from our reaction was extracted, dried, concentrated *in vacuo*, recrystallized, and compared to the product from the general reaction without lithium. TLC and 1H NMR spectroscopy confirmed an ether linkage solely on the 2-position, creating a mono-product with decreased polarity. Results support that our reaction efficiently produced the preferred mono di-ether purpurin product. In future studies, the sorption of this product on to PLA and other fabrics will need to be assessed and other natural anthraquinonoids and halides maybe be analyzed using our lithium-mediated reaction . The funding for this work was provided, in part, by National Science Foundation via CENSES REU at CCNY, OK-Louis Stokes Alliance for Minority Participation, and Langston's Integrated Network College at LU.

### II Prize Winner

***Interactions of Fullerene Derivatives and HIV-1 PR Catalytic Site: Quantum-Mechanical Analysis and Molecular Modeling***

**Shanah Sharpe**<sup>1</sup>, Lucky Ahmed<sup>2</sup>, Bakhtiyor Rasulev<sup>2</sup>, Jerzy Leszczynski<sup>3</sup>. Fort Valley State University, Fort Valley, GA; <sup>2</sup>Interdisciplinary Center for Nanotoxicity, Jackson State University, Jackson, MS; <sup>3</sup>Department of Chemistry and Biochemistry, Jackson, MS.

This research is focused on the investigation of fullerene derivatives that can bind into the HIV-1 PR catalytic site. HIV-1 PR is an essential enzyme for the HIV virus to replicate. In order to prevent the virus from replicating, the enzyme has to be deactivated. Fullerene derivatives could be effective agents for the deactivation. Five fullerene derivatives were modeled. These fullerene derivatives were optimized by the density functional theory (DFT) with M06-2X functional. The basis set 6-31G (d,p) was used. Some quantum mechanical parameters such as HOMO and LUMO of the molecules

## | AWARD WINNERS

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have been calculated. Then after optimization, the fullerene derivatives were docked into the HIV-1 PR cavity using a docking software, AutoDock Vina. The binding sites of the HIV-1 PR inhibitor have been explored and analyzed. The interactions between the fullerene derivatives and the HIV-1 PR receptor cavity site were observed. The hydrogen bonds presence and the interactions between the protein and the studied ligands have been discussed.

### III Prize Winner

#### ***Analysis and Capabilities of a Mobile Potentiostat***

**Nicholas Sapp**<sup>1</sup>, Brandon Jeffery<sup>2</sup>, Jessica Koehne<sup>3</sup>, Meyya Meyyappan<sup>3</sup>, Tamara F. Smith<sup>2</sup>, Govindarajan Ramesh<sup>1</sup>. <sup>1</sup>Department of Biology, Norfolk State University, Norfolk, VA; <sup>2</sup>Department of Electrical engineering, Tuskegee University, Tuskegee, AL; <sup>3</sup>NASA Ames Research Center, Moffett Field, CA.

A potentiostat is an instrument used in chemical and biological tests using the fundamentals of electrochemistry to collect data. This instrument has been applied as a sensor of reactions in biological systems. Currently, potentiostats are limited to lab use across the world and cost in the upward range of ten to twenty thousand dollars. Our goal was to construct a smaller, mobile potentiostat that is significantly cheaper for field use and potential space exploration. The CheapStat<sup>1</sup> device outlined the design and test experiments for our own portable potentiostat. Our mobile potentiostat was assembled using soldering techniques and programmed to perform cyclic voltammetry, linear sweep voltammetry, and AC voltammetry. Cyclic voltammetry analysis was performed on dilutions of potassium ferricyanide ( $K_4Fe(CN)_6$ ) and ascorbic acid (vitamin C) by the commercial potentiostat, ElectroChemical Work Station Model 600 D Series Serial #A2220, and compared to our mobile potentiostat. The oxidation/reduction reaction of diluted samples of over-the-counter acetaminophen was monitored using linear sweep voltammetry. Quantitative analysis of each result demonstrated an analogous direct relationship between the substance concentration and current output in measurements taken by the mobile potentiostat and commercial potentiostat. Ideal comparative trends were obtained from the mobile potentiostat demonstrating it has the same basic functionality necessary for use as an effective biosensor. These comparable measurements lay foundation for further improvements on the mobile potentiostat. In conclusion, for quantitative purposes the mobile potentiostat is comparably functional to the

commercial potentiostat. Further investigations include testing done with a proper covering. Also, changing the working electrode and varying the experimental conditions to simulate possible field situations. *This project was funded by NASA-NSTI program.*

## UNDERGRADUATE POSTERS

### Biology-A

#### I Prize Winner

#### ***Understanding Hepatic Immune Activation in the SIV/Macaque Model of HIV***

#### ***Hypochlorous Acid Mediated Oxidation of Methionine and Methionyl Peptides***

**Yao Akpamagbo**<sup>1</sup>, Sainath Babu<sup>1</sup>, Michelle Waddell<sup>1</sup>, Rao M. Uppu<sup>2</sup>, Michelle O. Claville<sup>1</sup>. <sup>1</sup>Department of Chemistry, Hampton University, Hampton, VA; Department of Environmental Toxicology, Southern University, Baton Rouge, LA.

Methionine (Met) is one of the two sulfur containing amino acids, susceptible to oxidation by reactive oxygen species (ROS). Oxidized forms of Met have been observed in age-related degenerative diseases such as Alzheimer's and Parkinson disease. Much attention has been given to the generation of methionine sulfoxide, and less is known about the formation of other oxidized products such as dehydromethionine, which is formed by the hypochlorous acid ( $HOCl/OCl^-$ ) oxidation in neutrophils. In order to understand the mechanism behind the oxidation, Met and Met-containing peptide (2  $\mu$ mol) was allowed to react with 0 to 3  $\mu$ mol of  $HOCl/OCl^-$  in 2 mL of 0.1 M phosphate buffer, pH 7.0 that also contained 20 mM bicarbonate and 0.1 mM DTPA. The oxidation products were analyzed by RP-HPLC and monitored at 215 nm. Under these conditions, the MET and MET-GLY were found to elute with retention time of 3.2 min and 3.8 min. About 66.5% ( $\pm 11.1\%$ ,  $n=3$ ) of MET and 64.2% ( $\pm 6.5\%$ ,  $n=3$ ) of MET-GLY were found to oxidize with 1  $\mu$ mol of  $HOCl/OCl^-$ . The stoichiometric equivalents of  $HOCl/OCl^-$  completely decomposed both MET and methionyl peptide. The oxidation products were collected and characterized using NMR and MS. The results from these studies strongly suggest the formation of distronic radical intermediates formed

during the oxidation. Experiments were done to trap the radical intermediates formed during the reaction. (*This research is supported by grants from NSF1230357 (formerly 0847742) and HHMI52006300*).

## II Prize Winner

### ***Role of Connexin (Cx43) on the Formation and Expression of Sclerostin***

**Oghenerukeme Asagba**<sup>1</sup>, Yue Zhang<sup>2</sup>, Henry Donahue<sup>2</sup>. <sup>1</sup>Department of Life and Physical Sciences, Fisk University, Nashville, TN; <sup>2</sup>Department of Orthopedics and Rehabilitation, Penn State College of Medicine, Hershey, PA.

43(Cx43) is the most abundant connexin expressed in bone cells and is essential for the survival and function of osteocytes. One cell signaling function of osteocytes is the release of sclerostin which is antagonistic to bone formation. The objective of our experiment was to determine if Cx43 regulates the expression of Sclerostin. Primary osteocytes were isolated from the femur and tibia of four knockout and wild type mice using sequential collagenase and EDTA digestion. Also, osteocytic MLO-Y4 cell lines with Cx43 shRNA knock down (Cx43-) and overexpression (Cx43+) were utilized. Then the expression levels of Cx43 and Sclerostin RNA were measured using a real time polymerase chain reaction (RT-PCR). The results showed that the level of Sclerostin was higher in Cx43+ cell lines than Cx43- cell lines which showed little or no expression of Sclerostin. The results obtained support the hypothesis that Cx43 up regulates the expression levels of Sclerostin. These results may provide potentially new pharmaceutical targets to treat osteoporosis because regulation of sclerostin can be used as a bone-building treatment for patients with this disease. (*This work was supported by grant R01 AG013087 from the NIA, NIH, R03 AR057546 from the NIAMS, NIH and the Michael and Myrtle Baker Orthopedic Research Endowment*).

## III Prize

### ***Effects of Propranolol and Sympathetic Reactivity on Spatial and Visual Abilities in Autism Spectrum Disorders***

**Ashli Allen**<sup>1</sup>, Brad J. Ferguson<sup>2</sup>, Rachel M. Zamzow<sup>2</sup>, Morgan L. Lewis<sup>2</sup>, David Q. Bversdorf<sup>3</sup>. Department of Biology, Fort Valley State University, Fort Valley, GA; <sup>2</sup>Institute for Clinical and Translational Science, University of Missouri, Columbia, MO; <sup>3</sup>University Hospital NEU, Columbia, MO.

Autism spectrum disorder (ASD) is characterized by the presence of communication deficits, impaired social interactions, and repetitive, restricted behaviors. Most pharmacologic treatments for ASD are expensive and target psychiatric symptoms such as depression, repetitive behaviors, anxiety and agitation. Few treatments are aimed towards improving cognitive abilities. Propranolol, a non-selective beta-adrenergic antagonist, may provide cognitive benefits in ASD. Propranolol blocks the noradrenergic sympathetic response causing a decrease in stress and anxiety. Previous research suggests that propranolol improves cognitive flexibility in ASD. In the present study, individuals with ASD (N=5) participated in a two-session study where they received either 40mg of propranolol or placebo in a double-blinded, counterbalanced manner. Baseline sympathetic reactivity was tested prior to drug administration.

## Biology-B

### I Prize Winner

#### ***The Induction of Imposex in *Biomphalaria glabrata* Using Triphenyltin Chloride***

**Mohamed Dumbuya**, Freddie Dixon, Carolyn Cousin. Department of Biology, Chemistry and Physics, University of the District of Columbia, Washington, DC.

*Biomphalaria glabrata* is a freshwater snail which is an intermediate host for the parasite, *Schistosoma mansoni*, a flatworm responsible for schistosomiasis. *B. glabrata* is a hermaphrodite that sometimes lives in waterways contaminated with triorganotin compounds from paint found on fishermen vessels. These triorganotin compounds are known to produce imposex in gastropods. Imposex is a pathological condition involving the masculinization of females; however, *B. glabrata* is a hermaphrodite that deviates from the expected female to male transformation. Imposex will interrupt the life cycle of the schistosome, thus preventing schistosomiasis. This project began by examining fecundity for 2 months in the snails' normal milieu, water. Ten snails were placed in the following concentrations, 5x10<sup>-5</sup>ppm, 5x10<sup>-4</sup>ppm, 5x10<sup>-3</sup>ppm and 3x10<sup>-3</sup>ppm of the triphenyltin chloride to obtain the LD<sub>50</sub> and 10 control snails remained in distilled water. The LD<sub>50</sub> was determined to be 5x10<sup>-5</sup>ppm and was used as the milieu for the experimental snails. LM and EM were done on the snails from each group, in order to obtain the initial morphology of the ovotestes. Paraffin embedding

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was used and sections cut and examined with a Leica light microscope. Fecundity results indicated that there was considerable reduction in the eggs production in the experimental as compared to the controls. The eggs were deformed and smaller in the experimental. Initial studies on the morphology of the ovaries confirmed the acinar arrangement with oogonia forming in the walls and spermatogonia in the lumen. Initial results does not indicate that the imposex condition has been achieved. (Supported by NIH/NCI-5R2 5CA129035, NSF/HBCU-UP-HRD-0928444).

### Joint II Prize Winners

#### ***Effects of Temperature and Salinity on *Vibrio parahaemolyticus* Growth Rate In Vitro***

**Jermaine Dorsey**<sup>1</sup>, Mamie Coats<sup>1</sup>, Crystal N. Johnson<sup>2</sup>. <sup>1</sup> Department of Biological Sciences, Alabama State University, Montgomery, AL <sup>2</sup> Department of Environmental Sciences, Louisiana State University, Baton Rouge, LA.

*Vibrio parahaemolyticus* (*Vp*) is a halophilic Gram-negative bacterium found abundantly in estuarine and marine environment and is known to cause gastroenteritis in humans. Exposure is linked to the consumption of raw or under-cooked oysters and other shellfish. The objective of this study was to examine at the effects of temperature and salinity on the in vitro growth rates of *Vp* containing the gene thermostable direct hemolysin (*tdh*) and *tdh*-related hemolysin (*trh*), which are pathogenicity factors. Samples were collected from the Gulf Coast regions of Louisiana from oysters and sediment. Isolates were cultivated from collected samples through a method of direct plating and colony hybridization, which is a probing method to identify and quantify the various *trh*, *tdh*, and *tlh* genes associated with *Vp*. In this study, several isolates containing only, *tdh*, *trh*, both genes, or neither gene were grown to calculate the number of generations over a set period of time. *Vp* was incubated at 10°C, 21°C, 25°C, 31°C, 37°C and in salinity concentration of 2% and 3.5% to stimulate temperature changes in estuaries and in the open ocean, respectively. All groups of isolates had more generations at 2% than 3.5%. The temperature to achieve the maximal number of generations varied among the groups. Isolates with neither gene experienced highest levels of growth in 21°C while isolates containing both genes had maximal generations at 10°C. These data suggest that estuaries are a more likely environment for all groups of isolates due to the salinity requirements. Overall,

this study provides a deeper understanding of *tdh*- and *trh*- containing environmental isolates that have the potential to become pathogenic in humans.

#### ***Solar Farm Effects on Eastern Box Turtles (Terrapene carolina carolina) Home Range***

**Jasmin Jenkins**. Department of Biology, Southern University at New Orleans, New Orleans, LA.

Eastern box turtles (*Terrapene carolina carolina*), one of the most common terrestrial reptiles in the eastern United States, are a k-selected species with a conservation status of vulnerable. According to the IUCN (International Union for Conservation of Nature) red list “eastern box turtles have an ongoing decline that exceeds 30% over three generations”. One of the many causes of their decline is habitat destruction. At Brookhaven National Laboratory (BNL), 200 acres of land, which is home to box turtles, was converted to a solar energy farm. As part of a preliminary study box turtles were captured inside the solar farm, to study the effects it may have on their home range. Using 6 turtles from a previous study and 20 new turtles, their home range was studied using radio telemetry equipment, a global positioning system (GPS) unit and Arc GIS software. Observations showed the 6 turtles from the previous studied had an average home range between 0.3-1.7 hectares. Of the 14 turtles initially caught inside the solar farm, only 1 move backed into the area. This may be due to the lack of vegetation, cover and food available to them. The turtles traveled in the forest surrounding the solar farm. This being the first year of a multi-year project, further research will be conducted to gain detailed information on the turtle’s use of the solar farm. (This research is supported in part by Brookhaven National Laboratory).

## Biology-C

### I Prize Winner

#### ***Investigating The Role of a *Caenorhabditis elegans* Forkhead Transcription Factor in Neuron Development (B)***

**Sarah Kayode**, Brian Nelms. Department of Biology, Fisk University, Nashville, TN.

The nematode roundworm *Caenorhabditis elegans* is a good model for understanding neuronal development

because of its simplicity, genetic conservation with mammals, and suitability for experimental manipulation. The development of neurons into specific types is a highly regulated process. For instance, dopamine (DA) neurons must have the correct amount of signaling molecules, controlled in part by transcription factors. One family of transcription factors, encoded by the *forkhead (fkh)* genes, is important for many developmental processes in both worms and mammals. Our lab is investigating the role of these FKH transcription factors during neural development, particularly *fkh-8*, which is expressed in dopaminergic neurons. Our research involves studying a deletion in the allele of the *fkh-8* gene for developing a quick and reliable method for genotyping the worms. Because the mutant worms do not have an immediately visible phenotype, this genotyping method will be essential for future studies in determining whether worms obtained from genetic crosses with other mutant strains have the *fkh-8* deletion or not. As an initial step of this research, we designed and validated primers for a PCR genotyping strategy to detect mutant and wild-type alleles to assist in later studies of DA neuron development, where we hope to uncover results that will give insight into DA-related disorders, such as Parkinson's disease, dystonia, schizophrenia, and attention deficit hyperactivity disorder (ADHD).

## II Prize Winner

### ***Genetic Mapping of EMS Induced Drosophila Mutants with Defects in Synaptic Development***

**Monicah Jepkemboi**<sup>1</sup>, Nicolas G. Bazan<sup>2</sup>, Chunlai Wu<sup>2</sup>. <sup>1</sup>Department of Biology, Southern University at New Orleans, New Orleans, LA; <sup>2</sup>Louisiana State University Health Sciences Center New Orleans-Neuroscience Center of Excellence, New Orleans, LA.

*Drosophila* serves as a powerful model system to study the development of synapse. Synaptic studies are the central issues in developmental neurobiology that has been used to isolate the large number of drosophila mutations using phenotypic analysis. Taking advantage of forward genetic screen, the Wu lab previously isolated a group of EMS (Ethylmethanesulfonate)-induced fly mutant alleles that show a spectrum of interesting phenotype in synaptic development. The research entails genetic mapping of two of these EMS-induced mutants (3p062 and 3p036). In this way, it is possible to narrow down the mutation to a specific locus thus allowing further study to identify individual gene that is responsible for synapse development. The two goals of this research are first to use deficiency mapping to map

two EMS-induced fly mutant alleles. Then secondly, to confirm the identified region using phenotypic analysis and characterize the mutant phenotype using synaptogenesis. For the earlier goal, the two independent mutations on the third chromosome were mapped using deficiency mapping. Adult flies of 177 individual deficiency lines were crossed with three virgin flies of the mutant genes. First generation progenies were then examined to identify their genotypes by phenotypic markers, afterwards searched for lines showing pupal lethality among mutant over deficiency animals. Five mutants of 3p062 and one mutant of 3p036 failed to complement the mutant pupal lethality. The mutant phenotype 3p062 was characterized through immunocytochemistry (IHC) with multiple pre- and post-synaptic markers of mutant larval NMJ. The IHC staining showed enlarged synaptic boutons. In summary, my work narrows down the mutation to a more specific locus in the chromosome thus allowing subsequent loss-of-function study to decisively identify individual gene that is responsible for normal synaptic development. [*This project was funded by the National Institutes of Health through the National Center for Research and National Institute of General Medical Sciences, Louisiana Board of Reagents Support Fund and Louisiana Biomedical Research Network (LBRN)*].

## III Prize Winner

### ***Role of CCDC130 in Neuroblastoma Cell Lines***

**Solomon Lynch**, Malathi Ramalinga, Mika Shimoji, Deepak Kumar. Cancer Research Laboratory, Department of Biology, Chemistry and Physics, University of the District of Columbia, Washington, DC.

Neuroblastoma is the most common extra cranial solid cancer in childhood and the most common cancer in infancy. It is a neuroendocrine tumor, arising from any neural crest element of the sympathetic nervous system. CCDC 130 is a newly discovered protein in our lab, known to modulate apoptosis in cancer cells. Earlier studies in our lab have also demonstrated CCDC130 as a caspase-8 substrate in multiple cell lines. Caspase-8 is an apoptosis-related cysteine peptidase enzyme with a central role in receptor-mediated apoptosis such as TRAIL (Tumor necrosis factor Related Apoptosis Inducing Ligand). Our long-term goals include characterization of CCDC130 in cell signaling including elucidating its role as a caspase-8 substrate. It is plausible that the cell lines that contain endogenous caspase-8 will have more interaction with CCDC 130 and have a different TRAIL mediated apoptotic response than the cell lines



that are caspase-8 deficient. Several Neuroblastoma cell lines lack caspase-8 while expression of CCDC 130 for neuroblastoma is not known. The present study aims to characterize the expression of CCDC 130 plays in neuroblastoma cell lines that have endogenous caspase-8 as well as cell lines that are caspase-8 deficient. SH-EP, SH-310, CA-2-E, SK-N-SNH (mRNA only) are S-type Neuroblastoma cell lines. They have endogenous caspase-8, are noninvasive cells, and are highly sensitive to TRAIL induced cell death. IMR-32, IGR-N91, LAN-1, SH-SY5Y, Be (2) M17 are N-type Neuroblastoma cell lines. They are caspase-8 deficient, invasive cells, and resistant to TRAIL induced cell death. Immunocytochemistry will be used to identify the cellular localization of CCDC130. Western Blot will be used to identify protein expressions and quantification of gene expressions (in terms of mRNA). RT-PCR and/or qRT-PCR will also be used to measure gene expression analysis. (*The study is supported by MARC – NIH/NIGMS -T34GM087172*)

## Biology-D

### I Prize Winner

#### ***Investigating Chest Wall Toxicity in SBRT Treatment for NSCLC***

**Kenny Regis.** Department of Biology, Fort Valley State University, Fort Valley, GA.

Stereotactic body radiation therapy (SBRT) is now a well-established modality for the treatment of early stage, inoperable, non-small-cell lung cancer with documented rates of local control as high as 98% at 3 years. While lung SBRT is generally well tolerated, concerns nonetheless persist regarding untoward late effects such as fatigue, pulmonary toxicity, and brachial plexopathy. Normal tissue complication concerns are even more bolstered by reports of increased frequency of rib fracture and chest wall pain post SBRT of peripherally located lung lesions. A number of recent studies have reported total dose, different fractionation schemes, and volume of the chest wall as crucial indices for chest wall (CW) pain, with elevated body mass index and diabetes mellitus the only patient related risk factors for CW pain that have been identified to date. We present a comprehensive dosimetric analysis of chest wall toxicity for IMRT of peripheral lesions (distance  $\leq 1.0$  cm from CW) as a function of tumor size, beam number and beam arrangement.

### Joint II Prize Winners

#### ***Detection of Nischarin and Integrin Levels in MDA-MB 231***

**Tanesia Patterson<sup>1</sup>**, Shengli Dong<sup>2</sup>, Prachi Jain<sup>2</sup>, Suresh Alahari<sup>2</sup>. Ruby Broadway<sup>1</sup>. <sup>1</sup>Department of Biology, Dillard University, New Orleans, LA; <sup>2</sup>Department of Biochemistry and Molecular Biology, Stanley S. Scott Cancer Center, Louisiana State University Health Sciences Center in New Orleans, New Orleans, LA.

Breast cancer is the most common cancer type in women. In later stages breast cancer usually metastasizes regional lymph nodes, lungs, bone and liver, leading to an increased risk of mortality. Nischarin, first discovered in breast cancer cells, is a known mouse endogenous tumor suppressor protein. By interacting with the alpha 5 beta 1 surface integrin, Nischarin inhibits Rac-induced cell migration and LIMK-driven cell invasion. Similarly, the human ortholog Imidazoline Receptor Antisera-selected (IRAS) protein associates with alpha5 integrin. With this research we aim to (1.) determine the presence and expression of various integrins in MDA-MB 231 clones for future analysis of whether Nischarin and its IRAS counterpart have any additional associations with other integrins and (2.) to discover if Nischarin has an alternate means of tumor suppression. Based on degradation shown in invadopodia experimentation, more invasive and aggressive cell lines exhibit more degradation of gelatin. Within the human body this translates as greater extracellular matrix (ECM) degradation. As Nischarin levels increase, ECM degradation decreases. As another tumor suppressor mechanism, Nischarin may decrease the production of matrix metalloproteinase (MMP) and subsequent ECM degradation and cancer cell invasion. Alpha5 integrin levels are all consistent in expression, however Nischarin levels aren't. It's been shown increased Nischarin levels lead to a decrease in alpha5 levels. The results don't support previous work. Perhaps, there is a threshold to which Nischarin levels begin to have a negative effect on alpha5 levels. FACS analysis shows high levels of alpha2 and alpha6 in 231 GFP cells. With such abundance it's possible Nischarin may also interact with these integrins. With these results future research will be conducted in immunoprecipitation of nischarin with expressed integrins to determine whether Nischarin associates with integrins other than alpha5. We hope to discover another means of tumor suppression by Nischarin so that future drug developments may be able to use such information to create drug therapies.

### **Functional comparison of Arabidopsis PBL proteins and PBS1 in RPS5 triggered HR**

**Isaiah Sloss**, Robert Hollins, Ullrich Dubiella, Rodger Innes. Department of Biology, Indiana University, Bloomington, IN.

In order to colonize and proliferate on their host, plant-pathogens deliver protein effectors into plant cells. These effectors then interrupt or alter signaling cascades and protein function within the cell to suppress the plant defense system and support pathogen growth. To combat this, plants over time developed so called effector triggered immunity (ETI) which relies on the specificity of R-genes. R-genes are genes that encode for proteins containing a nucleotide-binding site (NBS) and leucine-rich repeats (LRR). These NBS-LRR proteins detect specific pathogen effectors based on their effects within the cell. A hallmark of ETI is the hypersensitivity response (HR), which is a form of programmed cell death (PCD) localized to the site of pathogen infection. An example of the ETI system is the coupling of the protein kinase PBS1 (AvrPphB susceptible 1) and the R-protein RPS5 (Resistant to *Pseudomonas syringae* 5). PBS1 is the target of the effector protein AvrPphB from the bacterium *Pseudomonas syringae*. AvrPphB is a cysteine protease and cleaves PBS1 within the Kinase-domain. RPS5 monitors the status of PBS1 and initiates HR after PBS1 is cleaved by AvrPphB. PBS1 belongs to a subfamily of receptor-like cytoplasmic kinases (RLCK family VII), of which there are 45 in Arabidopsis. It was shown recently, that 8 additional members of this subfamily are also cleaved by AvrPphB. However it is still unknown as to why only PBS1 cleavage induces RPS5 triggered immunity. In order to decipher the RPS5 recognition motive of PBS1 we cloned 6 different PBL-proteins from Arabidopsis. By using transient expression in *Nicotiana benthamiana* we first tested if these 6 PBLs can be cleaved by AvrPphB and checked if cleavage of these 6 PBLs can trigger RPS5 dependent HR. In addition we try to answer the question if PBL proteins alone fail to trigger RPS5 dependent HR in *N. benthamiana*, is it possible to substitute one of the PBL cleavage products with the corresponding PBS1 cleavage product and trigger RPS5 dependent HR. By sequence comparison of PBL and PBS1 cleavage products we might get new insights into which motives are recognized by RPS5.

## Biology-E

### I Prize Winner

#### **Screening for Novel Interactions between Chromatin Proteins and Histone Modifications**

**Phillip Thomas**<sup>1</sup>, Romeo Papzyan<sup>2</sup>, Tonya Gilbert<sup>2</sup>, Sean D. Taverna<sup>2</sup>. <sup>1</sup>Department of Biology, North Carolina A&T State University, Greensboro, NC; <sup>2</sup>Department of Pharmacology and Molecular Sciences, Johns Hopkins University School of Medicine, Baltimore, MD.

Eukaryotic DNA is assembled into chromatin by interacting with nuclear proteins including histones. Chromatin exists in two structurally distinct forms that are epigenetically inherited; loosely packed regions (euchromatin) that permit transcription, and tightly packed regions (heterochromatin) that repress transcription. These structurally distinct forms of chromatin are regulated by post-translational modifications (PTMs) on histones, such as acetylation and methylation on lysine residues, which help to recruit specific chromatin-modifying proteins. While vastly different in their activities, these proteins contain conserved sub-domains that recognize specific histone PTMs. Most chromodomain-containing proteins are correlated with heterochromatin and strongly bind to histone PTMs that are associated with transcriptional silencing. For example, chromodomains that bind methylation on histone H3 lysine 9 (H3K9me3) are associated with constitutive heterochromatin, while chromodomains that bind H3K27 methylation are associated with facultative heterochromatin. The objective of this study was to characterize three heterochromatin-associated proteins (HP1, Pdd1p, and Pdd3p) and their binding differences for peptides marked by combinations of three heterochromatin-associated histone PTMs (H3K9me3, H3K23me3, and H3K27me3). In particular, we focused on studying how each of these proteins bind to H3K23me3, a novel heterochromatin-associated modification often found next to H3K27methylation. HP1, a known H3K9me3 binder, was observed to bind in a weak fashion to H3K23me3. While another H3K9me3 binder, Pdd3p, did not bind to H3K23me3. These results suggest that the binding pockets within the chromo-domains of Pdd3p and HP1 are structurally similar but not identical. Pdd1p, a strong H3K27me3 binder, did not bind to H3K23me3 which is only four amino acids away suggesting it is highly specific for H3K27me3. These studies will reveal greater insight into the function of each heterochromatin-associated

protein and may provide a better understanding of gene regulation at a molecular level.

### II Prize Winner

#### ***Human Lung Counter-Receptors for Siglec-8 and Siglec-9***

**Woldegebriel G. Yeibyo**<sup>1</sup>, Yadong Wei<sup>2</sup>, Steve Fernandes<sup>2</sup>, Ronald L Schnaar<sup>2</sup>. <sup>1</sup>Department of Biology, Chemistry and Physics, University of the District of Columbia Washington, DC; <sup>2</sup>Department of Pharmacology and Neuroscience, Johns Hopkins University of Medicine, Baltimore, MD.

Inflammation, attack by white blood cells, is carefully controlled by positive (activating) and negative (inhibiting) signals. Members of the siglec family of glycan binding proteins (sialic acid-binding immunoglobulin-like lectins) are expressed selectively on subsets of inflammatory cells, and may contain immune inhibitory intracellular domains that function to limit inflammation. As such, Siglecs are adhesion and signaling receptors on cells in the immune system. Siglec-8 is expressed on allergic inflammatory cells like eosinophils, mast cells and basophiles involved in asthma, while Siglec-9 is expressed on monocytes, neutrophils and certain T-cells involved in COPD (chronic obstructive pulmonary disease). Studies using human inflammatory cells and animal models support the hypothesis that specific glycan counter-receptors in the lung engage Siglec-8 and Siglec-9 to damp ongoing inflammatory responses. We are studying Siglec-8 and Siglec-9, expressed on eosinophils and neutrophils respectively that inhibit ongoing inflammation in the lung. Eosinophils are major contributors to the pathology of asthma and neutrophils to the pathology of COPD. This project aim was to express Siglec-8-Fc and Siglec-9-Fc in HEK293T cells and test their binding in a glycolipid-based ELISA. Siglec-8-Fc bound very specifically and profoundly to 6'sulfo sialyl LacNAc and Siglec-9-Fc bound with broader selectivity to 6 sulfo sialyl LacNAc, GT1b and GD1a specifically as compared to the other plated glycans. Hence, to probe for siglec counter-receptors, soluble engineered Fc-chimeric forms of Siglec-8 and Siglec-9 will be highly effective.

### III Prize Winner

#### ***Examining the Innate Immune Response of Streptococcus pneumoniae Exposed Human Epithelial Cells***

**Sonya Wolf**, Quincy C. Moore III. Department of Biology, Prairie View A&M University, Prairie View, TX.

*Streptococcus pneumoniae* (pneumococcus) is an opportunistic pathogen capable of causing ocular infections such as keratitis. The underlying condition of the cornea and the pathogenicity of the infecting bacteria play a role in the severity of corneal infection. The study examined host immune factors involved in bacterial ocular virulence through the use of Pneumolysin, a cytoplasmic pneumococcal protein. Utilizing human corneal epithelial cells (HCE), we examined the effects of different concentrations of pneumolysin at various time-points on the morphology, viability and the induction of pro- and anti-inflammatory cytokines. Recombinant pneumolysin was expressed in *E. coli*, purified using affinity chromatography, and analyzed by SDS-PAGE. The activity of purified pneumolysin was determined by a hemolysis assay using the following concentrations: 50, 100, 200, 300, 400, 450, 500, 850, and 1000 ng/ml. Both the active form and the heat-inactivated form of the protein were used. Human Corneal epithelial cells (HCE) were used to study the effects of pneumolysin in vitro. HCE cells were grown up in a T25 flask reaching a confluency of 85% and then split into 6-well plates for experimentation. HCE were exposed to pneumolysin at various concentrations: 125, 250, 500, 750 and 1000 ng/ml. The various concentrations were allowed to incubate on the cells for a time period of 30 minutes to 1 hour. After which the supernatant was removed from each well and an ELISA and Human Cytokine Array was performed on the supernatant. Fluorescence studies using Invitrogen Cytotoxicity assay were performed on the HCE cells following infection to determine live versus dead cells. The hemolysis assay showed that a minimum of 50 ng/ml of pneumolysin will lyse the red blood cells. The supernatants were assayed with a Cytokine Array to determine which immune factors were elicited from the different concentrations of pneumolysin which resulted in the presence of IL-6 and IL-8. Our studies provide insight into the induction of certain cytokines during pneumococcal ocular infection. The findings from our study will provide insight into the pathogen-host response that is triggered following infection with pneumolysin. This information is vital and can be useful in future novel therapies.

## Chemistry-A

### I Prize Winner

#### ***Transition States of DBT Molecule at the MoS<sub>2</sub>/Co<sub>9</sub>S<sub>8</sub> Interface: First Principles***

**Svetlana Gelpi**<sup>1</sup>, Alvaro Laham<sup>1</sup>, Gilles Berhault<sup>3</sup>, Brenda Torres<sup>2</sup>, Russell R. Chianelli<sup>2</sup>, Manuel A. Ramos<sup>2</sup>. <sup>1</sup>Science and Technology Department, Universidad Metropolitana, San Juan, PR; <sup>2</sup>Materials Research and Technology Institute, UT-El Paso, El Paso, TX; <sup>3</sup>IRCELYON-France, CNRS – Université de Lyon, Villeurbanne, France.

Sulfur removal in crude oil is one of most important applications when designing catalytic material to target hydrodesulphurization reactions. This particular study comprehends the quantum computational calculations for the transitional states during the HDS reaction in the molecular model of MoS<sub>2</sub>/Co<sub>9</sub>S<sub>8</sub>, which is a theoretical molecular model to describe the synergic contact between both crystallographic structures. Results obtained using the exchange correlation Perdew-Burke-Ernzerhof (PBE) functional indicate the existence of endothermic and exothermic transitions during the attachment of DBT molecules. In addition, it proves that promotion (addition of Co, Ni) provokes the electronic configuration of electron donor from Co into Mo; this allows the attachment of DBT molecules onto the MoS<sub>2</sub> slabs efficiently.

### Joint II Prize Winners

#### ***Synthesis, Structural Characterization, and Toxicity of a Triphenyltin Chloride Adduct with 4-Picoline N-oxide***

**Rowan Far**, Xueqing Song, George Eng. Department of Biology, Chemistry and Physics, University of the District of Columbia, Washington, DC.

Organotin, compounds that contain at least one Sn-C bond, express various biocidal activities. They range from being used as agricultural pesticides to being effective against cancer cells. The toxicity of organotin has been found to be a function of the number of organic groups attached to the tin atom, as well as to the nature of the organic group. Triorganotin compounds, those with three Sn-C bonds, have been reported to have the highest biocidal activities. The objective of this research is to synthesize a triphenyltin

chloride adduct, and determine its structure using x-ray diffraction and various spectroscopic techniques. In addition, the effectiveness against the gram positive bacteria, *Bacillus subtilis*, will be evaluated. The adduct was synthesized by reacting triphenyltin chloride with the ligand 4-picoline N-oxide in a 1:1 molar ratio. The structure of the product was determined using IR and NMR spectroscopies as well as X-ray diffraction. X-ray analysis indicated that the structure is a trigonal bi-pyramid with co-planar phenyl groups. This was in agreement with the spectroscopic results. In the solid state, the adduct is trigonal bipyramidal with three co-planar phenyl groups. Toxicity results indicate that the triphenyltin chloride adduct is effective against the gram positive bacteria *B. subtilis*. Future studies will involve synthesizing and testing other adducts on both gram negative, and gram positive bacteria. (*Financial support from the Science, Technology, Engineering, and Math (STEM) Program at the University of the District of Columbia is gratefully acknowledged*).

#### ***RNA-coliphage Q $\beta$ display system: A Modular Carrier for Biodrugs Scaffolding and Delivery***

**Kelvin Jones**, E. Eroglu, V. A. Dennis, S. R. Singh, A. B. Waffo. Department of Biological Sciences, Alabama State University, Montgomery, AL.

Biodrugs are greatly degraded and lose efficacy from exposure to normal body fluids containing enzymes such as proteases and nucleases. There is a need to protect and develop a structural support and delivery system for biodrugs. Biodegradable nanoparticles were found to protect DNA and protein but tend to aggregate. We hypothesize that by attaching nanoparticles to the surface of the bacteriophage Q $\beta$  which displays a well known number of nano-tags, the chimera phage platform produced will act as a modular carrier system for biodrug scaffolding and delivery. To achieve this goal, nano-tag genes [histidine-tag (HHHHHHHGS), streptavidin-tag (GGDVEAWLGARVPLVET) and avidin-tag (GLNDIFEAQKIEVWHE)] were separately inserted to the C terminus of the A<sub>1</sub> minor capsid protein gene of bacteriophage Q $\beta$  within the plasmid pBRT7Q $\beta$  containing the complete cDNA of Q $\beta$ . These tags were successfully synthesized with the primers used for their genetic construction. After sequencing, the plasmid pBRT7Q $\beta$  was found to contain the end of A<sub>1</sub> gene and these nano-tags were designated as pACpET24Q $\beta$ (Hist)<sub>6</sub>, pACpET24Q $\beta$ Strep and pACpET24Q $\beta$ Avid. The recombinant plasmids produced phage-like plaques upon *E. coli* HB101 bacteria transformation with a titer lower than the wild type (10<sup>8</sup>

## | AWARD WINNERS

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– 10<sup>9</sup> pfu). The correct tag gene size was confirmed by RT-PCR from plaques of each phage type. Ouchterlony double diffusion was performed with phages and the corresponding antibodies, which confirmed the presence of the tags on the phage surface. The Q $\beta$  (His)<sub>8</sub> phages were analyzed through scanning electron microscopy (SEM) with anti-His-tag antibodies and has confirmed the success of Q $\beta$  phage displaying histidine tag. We are currently analyzing other hybrid phages constructed. To our knowledge this is the first report on RNA coliphage Q $\beta$  displaying biologically useful surface tags or peptides. Future work will involve attachment of functionalized, biotinylated or conjugated streptavidin nanoparticles to these hybrid phages to assess biodrug scaffolding and delivery in animal model.

### Chemistry-B

#### I Prize Winner

##### ***Microwave Synthesis of Sulfoindocyanine Dyes***

**Rachael Matthews**, Angela Winstead. Department of Chemistry, Morgan State University, Baltimore, MD.

Heptamethine (Cy7) cyanine dyes are the interest of scientist because of their significant ability to luminescence in the near-infrared region, 650-900 nm. In the past, scientist had used pentamethylene (Cy5) dyes as fluorescent probes for *in vivo* pathogen detection which is limited to the 650nm region and is impeded by the natural fluorescence of biomolecules. In comparison to the Cy5, the NIR Cy7 is not obstructed by background interference and may exceed in photostability, Stokes shift, and pathogen detection limits. In this study, sulfoindocyanine dyes are specifically synthesized because they are highly water soluble compounds that maintain the natural existing properties in solution which is ideal for biological life forms. The specific aims of this approach are the synthesis of the: 1) potassium sulfoindole starting material, 2) sulfoindole heterocyclic salt derivatives, and 3) water soluble dye derivatives by applying microwave assisted organic synthesis (MAOS). MAOS is an eco-friendly, faster, and cleaner innovative technology to synthesizing sulfoindole heterocyclic salt derivatives of various N-alkyl groups and dye derivatives including Cy5 and Cy7 both symmetrical and unsymmetrical compounds. All structures were determined using a 400MHz nuclear magnetic resonance spectrometer. The dyes were also characterized using Cary UV/Vis spectrometer and HPLC. Concisely, the sulfoindocyanine dyes and

salts can be successfully synthesized using microwave technology. (*This research is supported in part by DoD:W911NF-11-1-0157, NSF HRD 0506066, NSF HRD 0627276, and RISE 5R25GM058904*).

#### II Prize Winner

##### ***Synthesis and Characterization of PEG-Porphyrins for Targeting the Epidermal Growth Factor Receptor***

**Russell J. Ledet**<sup>1</sup>, Krystal R. Fontenot<sup>2</sup>, Maria Graça H. Vicente<sup>2</sup>. <sup>1</sup>Department of Biology, Southern University A&M College, Baton Rouge, LA; <sup>2</sup>Louisiana State University A&M College, Baton Rouge, LA.

According to the National Cancer Institute, an estimated 102,900 (colon) and 39,670 (rectal) new cases were obtained in 2010. An estimated 51,370 people have died from colon and rectal cancers combined. This makes colorectal cancer (CRC) the second leading cause of cancer-related deaths in the United States. Consequently, the development of an *in-vivo* imaging agent that is selective for CRC has long been needed. Much of the detection for tumorigenesis relies on the efficacy in detecting small tumors. Current agents are not selective and often stain tissue not associated with the cancer cells making it difficult to delineate between viable and tumorigenic entities. This project introduces a novel macrocycle conjugated to polyethylene glycol linker, which we hypothesize will serve as the template for a selective molecule with high fluorescence yields that greatly increases earlier detection. Our targeted remedy is a porphyrin that is conjugated to a peptide with an affinity for the Epidermal Growth Factor Receptor (EGFR). Porphyrins are characteristically aromatically stable, contain trademark absorption bands in the visible and near-IR range, and have fluorescence quantum yields much above the current fluorophores. This makes the macrocycle optimal for confocal laser endomicroscopy (CLE) agent production. Consequently, we use a polyethylene glycol linker in order to increase water solubility, retain low toxicity, and to achieve high fluorescence quantum yields, as well as high conjugation yields. In this research, we were able to produce both precursors to the porphyrin-peptide conjugate, MesoPOR-(mono)-3PEG and MesoPOR-(di)-3PEG. These molecules were synthesized successfully with the use of peptide conjugation mechanisms. Molecular weights were confirmed using Matrix Assisted Laser Desorption Ionization Mass Spectrometry (MALDI-MS). Characterization was performed using <sup>1</sup>H Nuclear Magnetic Resonance (<sup>1</sup>H-

NMR) and Ultraviolet-Visible Spectroscopy (UV-Vis) of the intended molecules. The synthesized molecules, MesoPOR-(mono) 3PEG and MesoPOR-(di) 3PEG, will be useful in peptide conjugation that targets EGFR. These peptide ligands will increase selectivity and detect CRC via CLE.

### III Prize Winner

#### ***Development of an Absorbance Based Optical Probe for Detection of Iron (II) Using Sol-Gel Techniques***

**Ifeekam Ozonuwe**, Anael Kimaro. Department of Chemistry, Hampton University, Hampton VA.

The growing activity in the field of ion-sensitive optical probe devices and related optical methods for trace analysis of heavy metal ions has resulted in numerous sensing schemes, new indicator dyes and highly diversified methods of immobilization. The immobilization of sensing reagents onto optical probes is an important step in the development of optical sensors. The sensitivity of sensors containing immobilized reagents for detection of aqueous species is limited since chromophoric groups often require participation of more than one ligand and covalently bonded ligands have only a limited degree of freedom to reorient on the glass surface. This study investigates the possibility of doping sol-gel based materials with organic compounds by introducing the dopant along with the polymerization reactants. The dopants, that are captured in the material's cavities remain in part exposed to the surrounding environment and interact with water soluble analytes which penetrate through the pores of the materials. An absorbance-based optical probe for determination of Fe (II) was prepared using 1,10-phenanthroline as a sensitive reagent immobilized in sol-gel. This preparation involves hydrolysis and condensation of tetraethoxysilane, (TEOS), and vinyltrimethoxysilane (VTMOS) in acid, and in the presence of 1,10-phenanthroline producing a sol solution that was coated as films on glass slides and left to dry at room temperature. When these doped sol-gel glass detectors are immersed in solutions containing low concentrations of Fe (II), they concentrate the analyte from the solution as 1,10-phenanthroline in the film complexes with Fe (II) forming a complex that absorbs light. The absorbance of the complex was measured in solutions containing 0.10 – 1.0 mg/L of Fe (II) using a spectrophotometer. It is expected that, after optimization, the probe will be able to detect low concentrations Fe (II) in natural water.

## Computer Science/ Mathematics/Physics/Earth Science/ Environmental Science-A

### I Prize Winner

#### ***Genetic Algorithm for Efficient Nodes Distribution in Ubiquitous Applications***

**John McGrew**, Sajid Hussain. Department of Computer Science, Fisk University, Nashville, TN.

Due to the latest development in electronics and solid state devices, there are several ubiquitous applications, where numerous sensor nodes are deployed in a specific area for continuous monitoring. In this study, we consider mobile nodes, which move in random directions based on the given environment condition. The goal is to determine the minimum density of nodes while maintaining the desired coverage of the monitoring area, even though the nodes are not stationary. A genetic algorithm (GA) is proposed to obtain the near-optimal solution, where the desired density of nodes is obtained, while maintaining the desired coverage. The chromosome represents number of nodes, where the gene index represents the node (ID) and the gene value is the current location (x,y) coordinates. The initial population consists of a give number of random chromosomes. The GA operators such as crossover and mutation are applied to generate chromosomes for the next generation. The future generations are created until the improvement in fitness value is less than the given threshold. The GA fitness function considers several aspects such as weight of the minimum spanning tree, deviation in the degrees of nodes, the overall connectivity and the degree of the graph. Further, while computing fitness value, the mobility is applied based on the given mobility model. The proposed GA is implemented in Java and the simulation results show that the efficient solutions can be obtained from the proposed technique.

### II Prize Winner

#### ***Mobile Sink and Dynamic Intelligent Energy Efficient Clusters for Wireless Sensor Networks***

**Christopher Lee**, Sajid Hussain. Department of Computer Science, Fisk University, Nashville, TN.

Wireless sensor networks (WSNs) are commonly used for various pervasive and ubiquitous applications such as military, environment monitoring, security, surveillance, and healthcare. In WSNs, numerous sensor nodes, equipped with communication, processing, and storage capabilities, are deployed in a specific region. As long range radio transmission cost is significantly higher the radio receiving cost, the energy efficient communication protocols can extend the battery lifetime from a few days to several years. We use genetic algorithm (GA) to create energy efficient clusters based on the residual energies of the sensor nodes. Each cluster has a cluster head and a few cluster members. The cluster head receives messages from the cluster's members and transmit the aggregated data to the base station. The sensor node serves in the role of a cluster head for a given number of transmissions (100). Then, at base station, the GA is executed and a new set of clusters is created. All the cluster heads are informed about their status for the next round of messages. Further, a mobile sink is used to collect data from the cluster heads and to disseminate the reorganization of clusters, if needed. The proposed algorithm provides the engineering tradeoff between the frequency of flights of the mobile sink and extending the WSN monitoring lifetime (delaying the first node death). The proposed scheme is implemented in Java; the simulation results prove the feasibility of the proposed scheme in delaying the battery drainage of the sensor nodes. *(This research was made possible by the National Science Foundation).*

### III Prize Winner

#### ***Multi Robot Exploration: Sector Search with Rendezvous***

**Tommy Suriel**, Evanna Reynoso, Briana Wellman.  
Department of Computer Science and Information  
Technology, University of the District of Columbia,  
Washington, DC.

In coverage applications, such as exploration, search and rescue, and hazardous waste clean-up, the deployment of humans teams can be risky. Instead, multi robot systems can perform these tasks safer and faster. Communication between robots is a key factor for the completeness of such tasks. It reduces duplication of work and prevents robots from interfering with one another. However, communication is not always guaranteed. Limitations of communication networks can be unpredictable, especially in unknown environments. The quality of wireless connections can fade due to environmental interference. In addition, if

robots are exchanging large amounts of data, they can run into the issue of receiving incomplete information due to CPU overload. To deal with these challenges, approaches that do not require continuous point-to-point communications are needed. The Sector Search with Rendezvous approach is proposed as a way to overcome communication limitations. Each robot explores a sector, or designated area, and periodically rendezvous to share information. Instead of continuous passing messages, robots only communicate during rendezvous. The approach is compared to when robots do not communicate and to when robots communicate the entire time. The approach using no communications serve as baseline results. We propose that Sector Search with Rendezvous can efficiently coordinate a team of robots in an exploration task. Each approach was simulated in the 3D simulator, Webots. The robot controller was developed in the C programming language and experiments were conducted on a Quad Core 3.2 GHz machine running Linux with 8G of RAM. An emitter and receiver were aggregated on all the robots for point-to-point communications. Twenty trials were conducted using a three-team robot. Preliminary results suggest that Sector Search with Rendezvous is efficient in coordinating robots during exploration. The multi robot team using this proposed approach out performed the team using no communications. When compared to a team of robots continuously passing messages, it had comparable results. In conclusion, Sector Search with Rendezvous can serve as an alternative to approaches that use continuous point-to-point communications to distribute a multi robot system performing exploration. Future work includes validating Sector Search with Rendezvous in the real world using physical robots. *(The authors gratefully acknowledge the support of the following grant: NSF/HBCU-UP – HRD-0928444).*

Computer Science/  
Mathematics/Physics/Earth  
Science/  
Environmental Science-B

### I Prize Winner

#### ***Carbon Emission Study and Building Energy Assessment Bizuayehu***

**Hailemeskel**, Esther Ososanya. School of Engineering and Applied Sciences, University of the District of Columbia, Washington, DC.

This paper presents research work on Carbon Emission Study and Building Energy Assessment. Carbon Footprint is the measurement of greenhouse gasses that is released into the atmosphere by our daily use of carbon releasing energy whether it is directly or indirectly. The direct carbon footprint is referred to as the primary footprint and the indirect carbon footprint is referred to as the secondary footprint. The primary footprint is a measure of our direct emissions of CO<sub>2</sub> from the burning of fossil fuels including domestic energy consumption and transportation. We have direct control of these because we can chose to consume less energy such as electricity from the power plant or use public transportation instead of our own cars to reduce our carbon footprint. The secondary footprint is a measure of the indirect CO<sub>2</sub> emissions from the whole lifecycle of products we use - those associated with their manufacture and eventual breakdown. The Building Energy Assessment research demonstrates how saving consumption of buildings electricity can have an environmental impact. Such as reducing the consumption of electricity can dramatically lower the carbon foot print of a building in turn less carbon is released into the atmosphere. Following the carbon emission study and the documentation of energy consumption of the lighting fixtures at the University's Van Ness campus buildings, the next phase of this project will proceed to acquire room footage on campus where the fluorescent lightings in the room will be replaced with efficient high power LEDs lightings for illumination. The environmental impact will be monitored in real-time with wireless sensors and the cost savings evaluated. This energy conservation attempt with LED retrofit lights will decrease power consumption, increase life-span of lights, and decrease maintenance of lights on campus. The LED lights will be provided by the SavWatt Energy

Inc., and the students will work with the University Physical Plant to get the LED lights installed.

### II Prize Winner

#### ***Development and Characterization of Biodegradable PLGA Nanofibers Scaffolds as Matrices for Bone Tissue Engineering***

**Christian Rogers**<sup>1</sup>, Brandi Bethune<sup>1</sup>, Elijah Nyairo<sup>2</sup>, Monica Smith<sup>2</sup>, Manoj Mishra<sup>3</sup>. <sup>1</sup>Center for Nanobiotechnology Research, <sup>2</sup>Department of Physical Sciences and <sup>3</sup>Department of Math and Science, Alabama State University, Montgomery, AL.

This research aims to develop polymeric nanofibers that can be used as tissue scaffolds. Tissue scaffolds were fabricated by electrospinning synthetic biodegradable Poly(lactide-co-glycolide) (PLGA). The scaffold mimics the size scale, chemistry and functionality of the natural extracellular matrix (ECM) and is expected to be effective as a matrix for cellular growth, proliferation and new tissue formation. Nanoscale fiber scaffolds provide an optimal template for cells to seed, migrate and grow. The goal is for the cells to attach to the scaffolds, then replicate, differentiate and organize into normal healthy tissues as the scaffold degrades. The fiber stream during electrospinning was optimized by adjusting the concentration of the solution and process parameters (applied voltage, needle size, volume feed rate, distance of the collector plate from the needle tip) to assess their effect on scaffold porosity, thickness, and fiber diameter. SEM and subsequent image analysis revealed that the structure of the electrospun PLGA scaffolds significantly varied with solution concentration. *In vitro* degradation mechanism of PLGA was clarified by DSC and FTIR. PLGA's amorphous structure caused changes in the glass transition temperature (T<sub>g</sub>) over time as the polymer degraded. FT-IR data showed increase in O-H group absorbance over time. While studies involving fabrication of scaffolds based on PLGA and Hydroxyapatite (HA) are currently underway, preliminary studies reveal that at low concentrations, HA acts as reinforcement, whereas at higher concentrations the presence of aggregation appears to be detrimental to the scaffold. *(This study was supported, in part, by a grant from DoD/W911NF-12-1-0073).*

### III Prize Winner

#### ***Designing Circuits for In Situ Pressure Sensors in Microfluidic Devices***



## | AWARD WINNERS

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**Erin Lawler**<sup>1</sup>, Paulo Arratia<sup>2</sup>. <sup>1</sup>Department of Engineering, Hampton University, Hampton, VA; <sup>2</sup>Department of Mechanical Engineering and Applied Mechanics (MEAM), University of Pennsylvania, Philadelphia, PA.

Rheology is the study of the flow of matter and it is relevant in all parts of life. Whether it is the pumping of gasoline, the flow of blood cells, or the manufacture of candy bars, knowledge of viscous flow is integral to the success of modern society. Although there are a variety of techniques to quantify viscosity, the rheometer is among the most efficient. Traditional rheometers' function is to measure the response of a fluid to mechanical stress by rotating a fluid in a cylinder to determine its shear rate. When quantifying viscosity in microfluidic devices, the Reynold's number must be kept well below 1, in order to prevent inertia from becoming a more prevalent factor in comparison to viscosity. To accomplish this, microfluidic devices, rather than traditional rheometers, are employed to ensure that the viscous properties of a fluid remain the central focus. Piezo-resistive sensors, when integrated with microfluidic devices, can describe the nature of the flow of a fluid based on changes in its electrical properties. This research explores the sensors in two forms – the external pressure sensor, and the *in situ* sensor. An external differential pressure sensor was calibrated to serve as a monitor of the pressure-voltage relationship in a variety of experiments within the Complex Fluids Laboratory at the University of Pennsylvania. In addition, a circuit was designed for a piezo-resistive membrane, and functioned to amplify the output voltage, while also filtering out high frequency noise.

Computer Science/  
Mathematics/Physics/Earth  
Science/  
Environmental Science-C

### I Prize Winner

***Comparison of Drosophila Gene Expression Data with Mathematical Model Simulations using Statistical Analysis Tools***

**Marc Thompson**<sup>1</sup>, Chichia Chiu<sup>2</sup>. <sup>1</sup>Department of Bioengineering, North Carolina A&T State University, Greensboro, NC; <sup>2</sup>Department of Mathematics, Michigan State University, East Lansing, MI.

Mathematical models have been used to explain past and present evolutions in biological systems and the gene regulatory network in particular. With the ability to predict how genes are most efficiently activated and deactivated we will have a better understanding of life processes. In order to develop an efficient predictor of gene expression we generated three models of gene regulatory systems. Biological data of *Drosophila melanogaster* fruit fly embryos was used in a control model and was compared to what was considered a good and a bad model of mathematical simulation of *Drosophila* gene expression. *Drosophila* acts as an efficient subject due to their ability to rapidly produce new generation for study. The biological data expression was quantified by use of confocal microscopy using ImageJ image processing software, with the gene expression level being directly proportional to the pixel intensity of each image take. Images tracked the expression of three tagged genes in particular, known as the Snail, Twist and Rhomboid genes. Once the data was collected, we compared the model output data with the mathematical simulations with the intention of creating a differential equations solver that will effectively simulate gene expression. In order to evaluate the efficiency of the mathematical data sets several statistical analyses were performed. The tests used included the Root Mean Square Error test (RMSE), Correlation Coefficient test (CC), Analysis of Variance (ANOVA), and Kolmogorov-Smirnov (KS) tests. Results suggest that the chosen statistical analyses were capable of distinguishing between good and bad fit mathematical simulations, furthering the notion that mathematical models of biological data can be sufficiently applied to study biological systems such as the gene regulatory network. (NIH Funded; 5T34-GM083980-05).

### II Prize Winner

***Biological Reaction Network Modeling and Simulation with Stochastic Differential Equations***

**Edgardo Vázquez Rodríguez**<sup>1</sup>, Justin Hsia<sup>2</sup>, Ana Ferreira<sup>2</sup>, Michel Maharbiz<sup>2</sup>, Murat Arcak<sup>2</sup>. <sup>1</sup>Universidad Metropolitana, San Juan, PR; <sup>2</sup>University of California at Berkeley, Berkeley, CA.

The field of synthetic biology has been progressing as biologists and theorists collaborate to engineer new

systems that either mimic phenomenon found in nature or demonstrate other useful behaviors. Biochemical reactions are inherently stochastic and this necessitates the use of Monte Carlo simulations before any effort to proceed with experimental implementations. However, there often is a large disconnect between these Monte Carlo simulations and the deterministic models on which the designs and analysis are usually based. In this project, we will examine the spectrum of modeling and simulation techniques between ordinary differential equations (ODEs) and Stochastic simulations, in particular focusing on stochastic differential equations (SDEs) using the Langevin approximation.

### III Prize Winner

#### *Utilization of Early Childhood Programs*

**Schondell Thomas**, Rachid Belmasrou. Department of Mathematics, Southern University at New Orleans New Orleans, LA.

The objective of this research is to study Early Childhood Program Participation, which is a component of the National Household Education Survey. Specifically, we want to see which government programs are being used and whether or not more needs to be done in order to help. The Department of Education utilizes this report to accurately portray the makeup of American Households, whether or not children are attending school, whether the post-secondary education status of the parents affect their children's ability to do well in school and to see which government programs are used to assist parents throughout their child's time in school. Our first approach was to use the Confidence Interval Estimate to test the samples that the NHES collected for validity. We then ran a test on samples from those samples to check for further accuracy. The variables used in our experiment were the ages of the children, the age when the children first started school—at any level, and the proportion of children who were going to school. As it turns out, we found that only 60 to 63.3 percent of all children in the United States, between the ages of 3 and 6, attend school. Tests were also ran to check for the mode—highest frequency—of the children in our survey in order to perform a specific type of sampling to determine the correct sample size for the desired confidence level. Towards the conclusion of our research we established a Chi-Squared Test to discern how household income affected what parents allotted for their child's education. The factors used were the ages of the children, the ages of the parents, household income and the effects it has on the health of the child.

## Psychology/Science Education

### I Prize Winner

#### *The Effects of Dopamine D2 Antagonism are Reversed by Adenosine A2A Antagonism: Studies with Progressive Ratio/Chow Feeding Procedure*

**Chi'Niese Evans**<sup>1</sup>, Patrick A. Randall<sup>2</sup>, John D. Salamone<sup>2</sup>. <sup>1</sup>Department of Biology, Norfolk State University, Norfolk, VA; <sup>2</sup>Department of Psychology, University of Connecticut, Storrs, CT.

Organisms in a complex environment must frequently make cost/benefit decisions in order to obtain significant stimuli. Previous studies have found that dopamine (DA) plays a role in modulating this effort-based decision making in rats. The current studies utilized a novel procedure in which rats can either lever press on a progressive ratio (PROG) to receive preferred food pellets or instead approach and consume freely available, but less preferred lab chow. There were two basic aims for these studies. First, we wanted to demonstrate that the D2 antagonist eticlopride produced effort-related impairments on the PROG/choice procedure. Second, we investigated the capability of the adenosine A2a antagonist MSX-3 to reverse the impairments induced by eticlopride. It was hypothesized that, similar to previous work, eticlopride would produce a reduction in lever pressing. Moreover, administration of MSX-3 would reverse this impairment.

### II Prize Winner

#### *The Impact of Cross-Cultural Interaction Post Therapy*

**Michaela Bradley**<sup>1</sup>, Lisa Tobin<sup>2</sup>, Eartha Johnson<sup>1</sup>, Ruby Broadway<sup>3</sup>. <sup>1</sup>Department of Social Sciences and <sup>3</sup>Department of Biology, Dillard University, New Orleans, LA; <sup>2</sup>New Jersey Y Round Lake Camp, Newark, NJ.

This study will examine the impact of cross-cultural interaction post therapy. A counselor and counselee have a unique relationship and one they may draw upon positively if the therapy sessions are successful. Many who are not in the field of psychology view therapy as a place where people go if they are having problems. Still there are many more people who question the effects of therapy in changing one's life in the affirmative. Will a

positive change occur if the counselor and counselees are of different ethnic backgrounds? What role does culture play in the ability to convey concern over a problem? Yes, there is racism in America and there are some that speak to it specifically. The book entitled “Even the Rat was White” is one dedicated to the lives of clinical psychologists and other mental health professionals. Does racism have anything to bear in the counseling session or are observed differences brought on by differences in culture?

### **III Prize Winner**

#### ***Your Own Little Miracle: Decreasing Infant Mortality Rates in African Americans***

**Alexis Anderson**<sup>1</sup>, Sajid Hussain<sup>2</sup>. <sup>1</sup>Department of Biology and <sup>2</sup>Department of Mathematics and Computer Science, Fisk University, Nashville, TN.

Infant mortality is a health disparity that has become ubiquitous with African Americans. Infant mortality rates in the African American community are two times higher than the rates of other communities. “Your Own Little Miracle” is designed to teach college-aged African American women about infant mortality and how a woman’s overall health and wellness can contribute to the rates. We will partner with various community organizations such as Planned Parenthood of Middle Tennessee, the Metro Public Health Department and Birthing Project Nashville. The participants will receive the information needed to help ensure their overall health and wellness. Further, the participants will be asked to complete pre and post surveys in order to assess the effectiveness of the intervention. The target population for Your Own Little Miracle is fifty African American females ages, 18-22, preferably those who are single/unmarried. Participants must work, live, or attend school in the Nashville community. Prior knowledge of health disparities and infant mortality is not needed to participate in this intervention. This population may significantly contribute to the increase in the infant mortality rate because they may be uneducated about the issue, they are young, not financially stable, have a lack of prenatal care, and doctors (although not commonly) may overlook certain factors that may display signs of problems with the birth. This intervention will increase infant mortality awareness among African American women and give them the skills to increase their chances for healthy lifestyles and positive birth outcomes.

# HIGH SCHOOL Poster Competition



A unique feature of the NIS/BKX Joint Annual Meeting is its multi-prong Science Enrichment Component. It is the only annual national scientific forum that incorporates this type of component that at its core is community service and outreach. One of the 'prongs' of this component is the High School Poster Competition. The competition has been a standard feature of the Joint

Meeting for the past five years. High School students (and sometimes middle school) in the city/town of the Joint Meeting's host school(s) are invited to compete in the session. Students may prepare a poster of their current science projects or one previously prepared or presented at a science fair competition or other forum. The students, though judged by separate criteria, present in the same room, alongside of college students. The top placing high school posters will receive monetary awards, provided by the National Institute of Science: 1st Place (\$150); 2nd Place (\$100); 3rd Place (\$75); and Honorable Mention (\$50). The winners will additionally be recognized at the Awards Banquet and are invited to attend this event, with an accompanying parent or teacher, as a guest of the Joint Meeting. The teacher who brings the most presenting students will receive an award and recognition for his/her efforts. Participating students and teachers will receive the conference bag, meeting program book and a certificate of participation.



## HIGH SCHOOL **POSTER COMPETITION** WINNERS

**1st Place:**           **Alexys T. Riddick**

School:               **Lafayette High School**, Williamsburg, Virginia.

Poster:               *"The Role of Pseudophosphatase MK-STYX on Microtubule Dynamics".*

**2nd Place:**           **Jamika Acevedo**

School:               **McKinley Technology High School**, Washington, DC.

Poster:               "How do gene frequencies for the Duffy blood group antigens vary between and within different populations?"

**3rd Place:**           **Miles Peterson** (7th Grader)

School:               **Howard University Middle School of Mathematics and Science**  
Washington, DC.

Poster:               *"Is the Taste Worth the Weight?"*

**Honorable Mention:**   **Hannah Endrias** (8th Grader)

School:               **Howard University Middle School of Mathematics and Science**,  
Washington, DC.

Poster:               *"The Microscopic Invaders"*

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**Saturday, March 16, 2013****8:00 AM – 11:15 AM**

Guest Speaker:

**Joseph A. Isaac**Albert Einstein Distinguished Educator Fellow  
Division of Molecular and Cellular Biosciences  
National Science Foundation

## HIGH SCHOOL COMPETITION

**Joseph A. Isaac** is a ten-year veteran of secondary science education in the District of Columbia. He started his teaching career at Friendship Public Charter School's Collegiate Academy where he taught Biology, Honors Biology, and AP Biology. Mr. Isaac then joined the inaugural staff at the newly reopened McKinley Technology High School, the District's Science, Technology, Engineering, and Mathematics (STEM) School, where he helped create its Biotechnology Program. He served as the department chair for two years. During his eight-year stint at McKinley, Mr. Isaac taught General Biology, AP Biology, Forensic Science, Biotechnology 2, Molecular Biotechnology, Plant Biotechnology, Bioethics, and Biotech Senior Project. Additionally, he has served as an adjunct member of the Biotechnology Department at Fortis College in Landover, Maryland, where he taught Biochemistry and Protein Biotechnology.

Mr. Isaac is a proponent of the academic and tactile rigor of biotechnology under the auspices of Career and Technical Education (CTE). He believes that its proper implementation can not only train and develop higher order thinkers and doers to be more competitive in a global market but also help to counter some of the preconceived notions and prejudices about CTE courses. Mr. Isaac has developed partnerships with industry and academia throughout the Washington, D.C. metropolitan area that have served as mentors to many of his biotech students. As a result, several of his current and former students are now completing university-level bioscience research, some being published in peer-reviewed journals as high school students and undergraduates. "I am convinced that inquiry and project based hands-on laboratory science, combined with innovative master teaching, are vital components to a successful and enriching experience that students will take with them far beyond the confines of high school.

There are few things more powerful than a student who has unlocked his/her potential and is confident in their ability to compete at the next level."

Mr. Isaac participated in the Fulbright Educator Exchange program with the Islington School District in north London, UK in 2006. He presented at the National Association of Biology Teachers National Conferences in 2007-2008, the D.C. Biotech Mentoring and Dissemination Conference in 2008, and the Trans-Atlantic Science Mentoring Conferences in Washington, D.C. in 2008 and Oslo, Norway in 2010. He served as a judge at the BioGenius Challenge Science Competition at the BIO International Convention in Washington, D.C. in 2011 and has facilitated training of educators in biotechnology in Washington, D.C., Philadelphia, PA, and Portsmouth, VA. During the 2011-12 school year, Mr. Isaac served as a teacher cabinet representative for the District of Columbia Public Schools Chancellor, Kaya Henderson, and was a featured interviewee during the inaugural Digital Learning Day Town Hall Meeting in February.

Mr. Isaac completed his undergraduate studies at Howard University with a Bachelor of Science in Biology. After graduation, he worked for three years at the National Institute of Dental Research's Animal Care Unit as a laboratory technician. The next five years he worked in the Department of Microbiology and Immunology at the Uniformed Services University in Bethesda, Maryland. After starting his career in education, Mr. Isaac earned his Master's in Teaching Secondary Science at Trinity University. Mr. Isaac received a Fellowship from the National Science Foundation (NSF)/Directorate for Biological Sciences, Division of Molecular and Cellular Biosciences, where he is currently serving.

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# **70th BKX/NIS**

*Joint Annual Meeting*

## **EXECUTIVE SECRETARY REPORT**

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**Prepared by:**  
Kim Fenwick-Wooten

The 70<sup>th</sup> Joint Annual Meeting was held in Washington, DC March 13-17<sup>th</sup>, 2013. This year's theme for the meeting was "Bridging the Gap in STEM Research from Conception to Application." This meeting was extra special because it celebrated 70 years for a jointly held forum of two extraordinary organizations coming together to network, present scientific data and to encourage students to aim for excellence in the sciences. Also, it marked the first time in many decades that the meeting was held in Washington, D.C. This meeting has always maintained its mission of aggressively addressing the dearth of underrepresented minorities in the STEM disciplines.

The meeting began with an outstanding presentation from the Opening Plenary Speaker Dr. Kanta Subbarao. Dr. Subbarao is Chief of Emerging Respiratory Viruses Section at the National Institute of Allergy and Infectious Diseases (NIAID) at the NIH. One of her major responsibilities is to help design the annual influenza vaccine. The next day participants were honored to hear the informative presentation by Dr. Lawrence A. Tabak, Deputy Director at the National Institutes of Health. His major focus was the introduction of the new BUILD grant from the NIH Director's Office. The host institution, the University of the District of Columbia, arranged for buses to take attendees on a driving- guided tour of Washington that included the National Institutes of Health, Smithsonian, Walter Reed Medical Center, National Library of Medicine, Howard University, World Famous Ben's Chilli Bowl, the Lincoln Theater and the African American Civil War Memorial to name a few. The bus stopped on the National Mall for participants to visit the National Museum of Natural History, US Botanic Gardens, Air and Space Museum and at the Martin Luther King Memorial. The overall meeting was a success and created memories for the students that I hope will last for many, many years.

The students were very excited to hear the presentation of the Summa Lecturer, Mr. Jesse Eugene Russell, Pioneer and Innovator of Digital Cellular Technology. Mr. Russell cites that the original concept to take the phone out of the car was introduced by him. The students had heard of his accomplishments prior to the meeting but were extremely impressed with this humble and remarkably brilliant man. Dr. Kevin Gardner, the NIS Memorial Lecture was outstanding. Dr. Gardner heads the Center for Cancer Research at the National Cancer Institute at the National Institutes of Health. After his presentation, attendees ventured into the Grand Ballroom for the Evening Marketplace Expo with free food concessions. Students were allowed to interact with various school representatives that were there to highlight their professional programs, such as graduate school or internships. The atmosphere was light and allowed students to network with students from other schools and swap research stories. It also presented an intense opportunity for the exhibitors to meet with a large pool of students in one setting. A good time was had by all that attended.

On Saturday, the University, hosted the High School Program, which allowed students from area high schools to present their scientific research. The students were presented with awards and had the opportunity to listen to Mr. Joseph A. Isaac, Albert Einstein Distinguished Educator Fellow, and National Science Foundation. Mr. Isaac shared his experience teaching in the District of Columbia Public School System and then transitioning to National Science Foundation. He commented that one of his former students, Michael Smith, was a former student and now is a senior about to graduate with a degree in biology from the University of the District of Columbia. The day at UDC continued with a brunch held in the "transformed" Athletic Center." The brunch and outstanding lecture was sponsored by Beta Kappa Chi and was thoroughly enjoyable.

The meeting ended with the Awards Banquet and a celebration of the 70<sup>th</sup> year with a huge cake and a balloon display. Prior to entering the ballroom, participants were treated to a "Hollywood" style setting with backdrop and a red carpet display. Also, the festivities featured a video that highlighted



## | EXECUTIVE SECRETARY REPORT

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the history of the two organizations, the National Institute of Science and the Beta Kappa Chi Scientific Honor Society. In 1943, these two organizations join forces to present a national meeting opened to scientists from all ethnicities and various STEM fields. African Americans only attended; because this was their only opportunity to share and present the results of their scientific research. Special thanks are given to Dr. Valerie Holmes for her wonderful narration of the video and to Jazzy Blue who gave us musical magic with their professional melodies. After the banquet, students attended a night of karaoke and dancing. The faculty attended a social to continue to celebrate 70 years of a wonderful joint annual meeting. Jazzy Blue provided entertainment for the faculty and administrators.

I applaud the efforts of all of the committee members at the University of the District of Columbia for all of their hard work in making the meeting a memorable experience. Special thanks to Dr. Freddie Dixon for her efforts as chairperson of the local planning committee and her excellent leadership of this most outstanding meeting. Extra special thanks to Dr. Carolyn Cousin whose tireless commitment and dedication has made this year's meeting, as well as many others possible. Also, to Mrs. Anita Taylor who worked overtime in ensuring that students and faculty received their travel awards to attend the meeting and maintained vigilance in keeping awardees informed and updated on impending deadlines. This is just one of many tasks that she executes in a highly professional manner. I want to take this opportunity to thank our webmaster Dr. Nithya Raghavan, for creating and maintaining a very professional website for this Joint meeting which helps in the seamless execution of disseminating information, submitting abstracts, informing students and faculty about the presentations, registration for the hotel and meeting and, selection of judges. Many thanks also to Dr. Nithya Raghavan for her assistance with the abstracts and compiling the abstract book and assisting Mrs. Taylor with judging tasks and compiling articles for the Transactions. The meeting planning and execution went off without a hitch, thanks to the expertise of Dr. Deepak Kumar who also was instrumental in designing the excellent stage props, lighting and banners at the meeting venue. Visual documentation of the meeting by provided by Colella Digital which has made all photographs available through the meeting website. We wish to express our gratitude to Mr. Alex Medley, our graphic artist and printer extraordinaire who provided us with hard copies all the meeting flyers, program and abstract books and advertisements. The culmination of the hard work by Ms. Stephanie Graves was seen in the large number of exhibitors at the meeting. Last, but not least, many thanks to the many persons on the local planning committee and at UDC who help to make this meeting one of the most successful ever.

Twenty-thirteen (2013) also marked my second year as Executive Secretary. I have come to realize the importance of this position and the rewards and challenges associated with the duties of Executive Secretary. An intense membership campaign was launched when I took office. My aim was to increase the exposure of the National Institute of Science and expand membership. I revised and updated the NIS Membership Chapter Packet, which included step-by-step instructions on how to recruit students and conduct an Induction Ceremony (See below). Further, I collected membership and distributed pins, certificates as well as medallions to graduating seniors. I also decided that the NIS should consider printing member certificates on site, when possible. With the help of student officers, this can be done and thus, prevent any delays. This is something that will be test-driven at the 2014 meeting in Houston.

During the past year I assisted in designing the NIS Induction Ceremony for the NIS student club. The following is this Ceremony .

## NIS Induction Ceremony

### Induction Protocol, Pledge, Ritual, Motto, Poem, Symbol, and Colors

#### I. How to Start an NIS Membership Chapter:

- a) Candidates are recruited from the STEM disciplines:  
(Can be freshmen and must have at least a 2.5. All students must complete an undergraduate application and pay dues. Likewise, all faculty must complete a graduate application and pay dues). Applications will be emailed to Sponsor or can be obtained via the website listed below.
- b) The candidates are required to learn the basic history of the NIS found on the Website ([www.nationalinstituteofscience.org](http://www.nationalinstituteofscience.org)) at the time of their notice for initiation.

#### II. How to Conduct an Induction Ceremony:

The pledgees are seated in a group on the left of the room, while the membership is seated parallel on the right. In the front of the room is a table with three candles. The President in the center and the Secretary and Treasurer (secretary and treasurer) on their right of the candle. If you have a shield, it should be displayed in front of the candles, but not blocking them. On the table with the candles should be the latest copy of the Transactions, the membership certificates (First, application and national dues should be submitted to the National NIS Office- Address is on the application) and other literature available (NIS brochure) and the pins when ordered for the initiation.

#### III. The Faculty Advisors Recites the Official NIS Poem.

### Welcome the Challenge

If you only have an inch to move  
Then your vigor will be less intense  
If you only have a hill to climb  
Then, why prepare for a mountain  
If you only can see out of rose-colored glasses  
Then how can you know there is pain to avoid?  
If you only prepare for one exam  
How can you expect to pass the course?

Never, never see limitations  
Never do just enough to get by  
Start the race by running  
During the course of it, begin to fly  
See the world as it is  
So you can do something about what exist  
Go as far as you can humanly go  
Never, never pretend all is bliss

You are a powerful being  
There are few things you cannot do  
True or false, please feel this way

## | EXECUTIVE SECRETARY REPORT

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If you expect to make it through  
The realities of life may someday set in  
This will be as it always has been.  
But now attach you wings and go  
Where others have never been  
During your journey, you may falter  
During your journey and drop  
But because of all of us  
Until you reach the sky, we will never let you stop

**4. After seating the candidates, the President gives a brief history of the organization.**

**5. The meaning of the NIS Key:**



- (a) NIS stands for the name of the organization.
- (b) Surrounding the name is an electron orbit, a test tube and a leaf. These symbols represent the STEM (science, technology, engineering and mathematics/STEM) discipline.
- (c) The NIS as the following motto: Science can enlighten man like no other discipline, because it tends to be conclusive.

**6. Activation of Pledges by the President:**

I (your name), pledge to promote scholarly activities in science, technology, mathematics, and engineering including research, education, and outreach, in order to provide, whenever possible, opportunities for networking and dissemination of relevant information in these areas. THIS I DO PLEDGE.

**7. The administration of the oath follows, by the Vice-President (en masse) to the pledges who stand:**

**8. The Vice-President will then say:**

Our objectives are:

- (a) To stimulate and promote interest in scientific education, research and outreach
- (b) To assist in the encouraging other to seek careers in the STEM disciplines.
- (d) To reach back and guide and assist other who are an interest in STEM careers

**9. The candidates file past the Vice-President and the President who shake their hands and offer congratulations, and on to the Secretary (or secretary and treasurer) who does likewise, issues the materials, and, obtains their signatures (for records in case of ordering keys, etc., later), and then on to the members of the organization who in turn offer congratulations.**

**10. The Secretary gives a short lecture on the organization of the chapter and its activities. The new members are given an opportunity to ask questions of officers and old members.**

**11. Adjournment:**

The initiation might be followed by a banquet and a prepared contribution from a member of the chapter.

**Society Colors:** The official colors of the Society are Golden Yellow and Winter Green.

The following Universities either became or maintained their financial approval status during 2013:

Alabama State University  
Bennett College  
Delaware State University  
Dillard University  
Edward Waters College  
Fisk University  
Fort Valley University  
Hampton University  
Howard University  
Huston Tillotson University  
Indiana State University  
Jarvis Christian College  
Langton University  
Norfolk State University  
North Carolina A & T  
Prairie View A & M University  
Southern University at Baton Rouge  
Southern University at New Orleans  
Tennessee State University  
Tuskegee University  
University of the District of Columbia  
Universidad Metropolitana

Respectfully submitted by Kim Fenwick-Wooten: Feb. 19, 2014

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# Meeting **Announcements**

## **MEETING ANNOUNCEMENT**

The 72nd Joint meeting of BKX/NIS will be hosted during Spring 2015 at a venue yet to be determined. Look for the announcement in the meeting website [www.nisbkxmeeting.org](http://www.nisbkxmeeting.org) in **October 2014**.

## **STUDENT TRAVEL GRANT**

The National Institute of Science provides travel grants for science students and faculty to present research papers at the Joint Annual Meeting of NIS/BKX. Applicants must be members of NIS or BKX to be eligible for the award. Awardees will be selected on the basis of their qualifications, references from mentors, and career interests. Preference will be given to authors of abstracts submitted prior to presenting research at the Annual Meeting. Please be informed that the **NIS Travel Awards** can provide only **PARTIAL** funding for student travel/lodging to this meeting. The number of students requesting funding is growing faster than NIS resources. Each school may be responsible for funding as much as two-thirds of the expense of the trip.

Travel funds request for each school will be sent to the NIS or BKX mentor. The travel award will be sent to the schools faculty sponsor or representative. Hotel reservations, registration fees and hotel accommodations are the responsibility of the awardee school/faculty sponsor.

Students are expected to attend the entire conference a minimum of four days. If accepted, students are expected to arrive in time to attend the Opening Plenary Session, at least two workshops, distinguished lectures, the Memorial Lecture, student meetings, and visit the exhibit hall.

## **AWARDS**

The Joint Meeting sponsors a Graduate Oral & Poster Session for graduate students or young investigators with terminal degrees **within the past two years**, to present their research at the Joint Annual Meeting and an undergraduate poster session. Awards are given for the most competitive presentations. Research areas are in biology, chemistry, environmental science, physics, computer science, mathematics, science education, engineering, earth sciences, psychology and social science.

### **GRADUATE & UNDERGRADUATE ORAL PRESENTATION**

For the **ORAL** presentation, only an abstract must be submitted by the due date. Awards will be made for this Session based on the written abstract and oral presentation.

### **GRADUATE & UNDERGRADUATE POSTER SESSION**

For the **POSTER** Session only an abstract must be submitted by the due date. Awards will be based on the poster presentation during the meeting.

### **IMPORTANT INFORMATION REGARDING DEADLINES AND AWARDS**

Abstracts submitted for both sessions **by the deadline** due date **WILL BE ELIGIBLE** for awards, Abstracts submitted **after the due date** but before the closing of the site will be accepted but **WILL NOT BE eligible for awards**.

### **ABSTRACT SUBMISSION INFORMATION**

**No abstracts will be accepted by e-mail. All abstracts must be submitted ONLY through the meeting website [www.nisbkxmeeting.org](http://www.nisbkxmeeting.org)**

## **NIS would like to hear from you**

Write or e-mail comments, opinions or suggestions to the Transactions Editor Dr. Nithya Raghavan (raghavan.nithya@gmail.com) or the Conference Director Dr. Carolyn Cousin (ccousin@udc.edu). If you need information on how to start a new NIS chapter in your school, please contact Dr. Carolyn Cousin at the address given below to get your starter kit. Additionally, let us know about the NIS Chapter activities you plan during the year. Other chapters may generate ideas from your plans for use in a unique setting. NIS Chapters need to maintain contact throughout the year.

## **Contact information on NIS activities**

### **Dr. Carolyn Cousin**

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Colella Photo

70th Joint Annual Meeting of BKX and NIS  
Reston, VA ~ March 2013  
University OF The District OF Columbia, Host