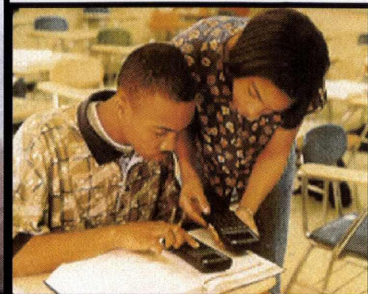
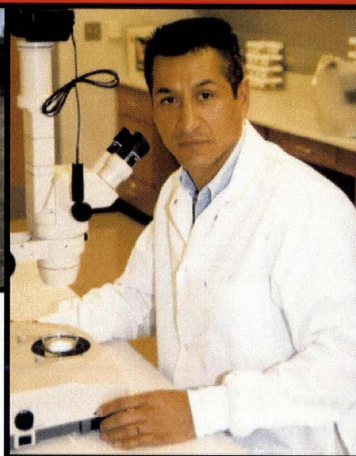


opt-ed alliance day



FIRST ANNUAL OPT-ED ALLIANCE DAY



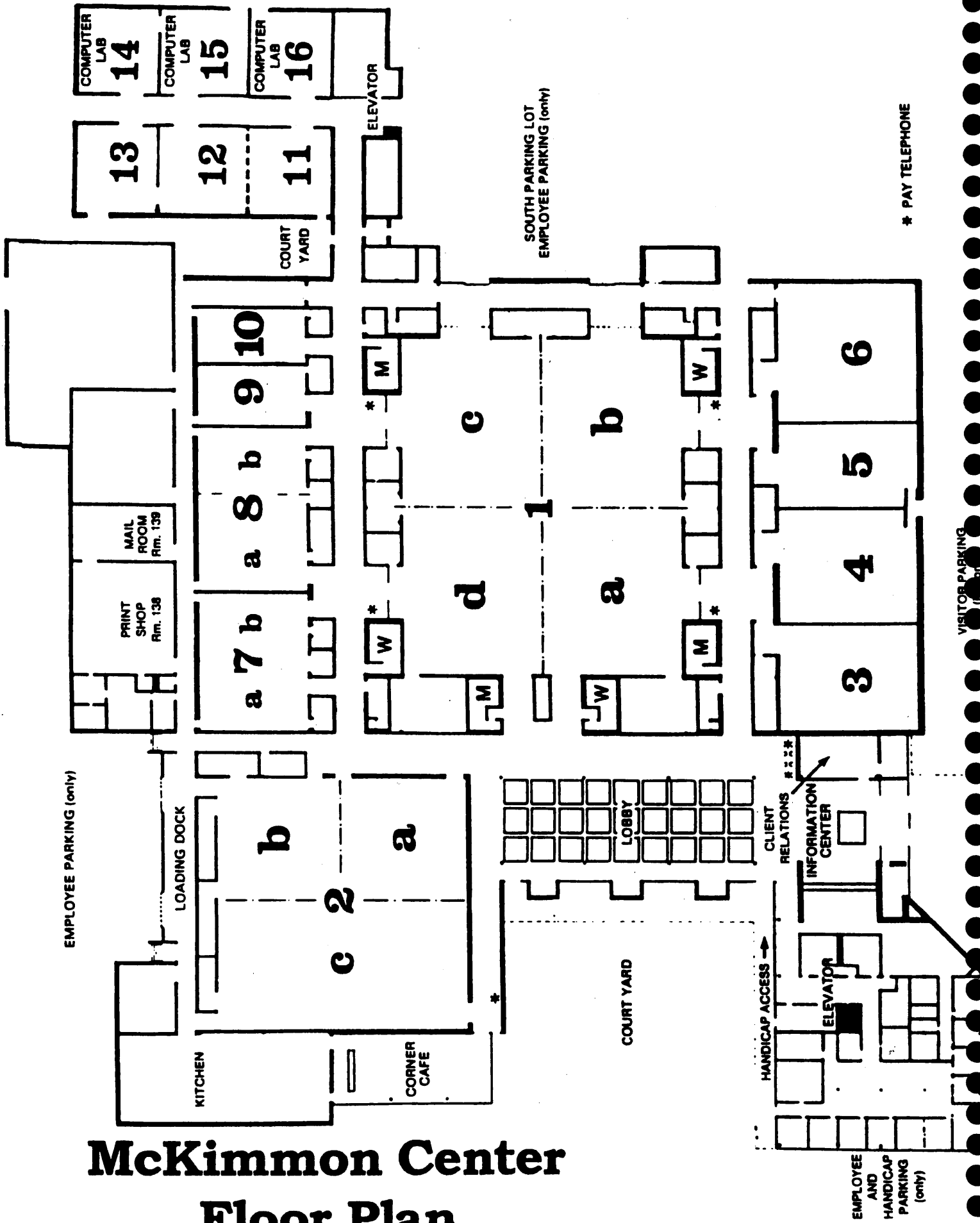
FRIDAY, SEPTEMBER 20, 2002
JANE S. MCKIMMON CENTER
NC STATE UNIVERSITY
RALEIGH, NORTH CAROLINA

FIRST ANNUAL OPT-ED ALLIANCE DAY

AGENDA AT-A-GLANCE

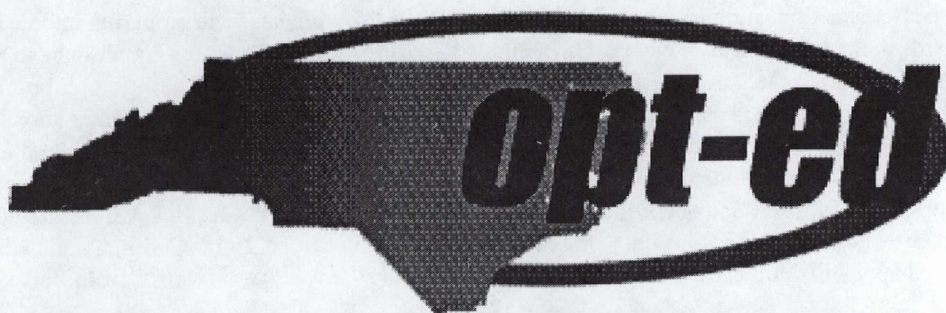
7:30 am – 12:00 noon	REGISTRATION (Recruiting tables should be set up by 8:00 am)
8:00 am – 9:00 am	STUDENT POSTER SET-UP AND CONTINENTAL BREAKFAST
9:00 am – 9:45 am	WELCOME/OPENING SESSION
9:45 am – 10:00 am	BREAK
10:00 am-12:00 noon	CONCURRENT WORKSHOPS
12:00 noon-1:30 pm Keynote Speaker:	LUNCHEON SESSION Dr. Donald Thompson, <i>Director</i> <i>Division of Human Resource Development, National Science Foundation</i>
1:30 pm-2:50 pm	POSTER PRESENTATIONS BRIDGE Program Meeting (<i>BRIDGE Participants please go to Room 6</i>)
3:00 pm-4:30 pm	ORAL PRESENTATIONS
4:30 pm	CLOSING RECEPTION

McKimmon Center Floor Plan



EMPLOYEE AND HANDICAP PARKING (only)

* PAY TELEPHONE



NC-MSEN HBCU-UP LSAMP CREST AGEP

North Carolina Alliance to Create Opportunity through Education

The North Carolina Alliance to Create Opportunity through Education (OPT-ED) is a partnership among NSF-sponsored diversity programs at Bennett College, North Carolina Agricultural and Technical State University, North Carolina State University, Saint Augustine's College, the University of North Carolina at Chapel Hill, and the North Carolina Mathematics and Science Education Network.

The programs that constitute OPT-ED (NC-MSEN, HBCU-UP, LSAMP, CREST, AGEP) operate both individually and cooperatively to diversify the science, technology, engineering, and mathematics (STEM) workforce and academe by encouraging underrepresented minority students, from middle school through graduate school, to obtain the Ph.D. in one of the STEM disciplines. Serving as a catalyst for greater synergy among these NSF-sponsored partners, OPT-ED strengthens their collaboration and cooperation for excellence in STEM education and research, promoting activities that magnify their efforts to achieve common goals. Additionally, OPT-ED provides a central office for communicating with neighboring NSF-sponsored, diversity-focused programs with similar goals.

<http://opt-ed.ncsu.edu>

The North Carolina Alliance to Create Opportunity Through Education

MSEN

Since 1986, the Mathematics and Science Education Network (MSEN) Pre-College Program has been preparing middle and high school students to achieve high standards in mathematics and science. NSF funds PREP (Pre-College Research Experience in Science, Mathematics, and Technology Program) within the MSEN. PREP is a research experience program for high-ability/high-potential secondary teachers and students. OPT-ED includes the UNC-system MSEN serving as the coordinating office of ten center sites located on public university campuses statewide. Each campus strives to fulfill the mission of MSEN: to improve both the teaching and learning of science in North Carolina. MSEN center sites include the following: Appalachian State University, East Carolina University, Fayetteville State University, the Greensboro Area Math and Science Education Center (sponsored by North Carolina A&T State University and the University of North Carolina at Greensboro), North Carolina School of Science & Mathematics, North Carolina State University, University of North Carolina at Chapel Hill, University of North Carolina at Charlotte, University of North Carolina at Wilmington, and Western Carolina University.

HBCU-UP

The NSF Historically Black Colleges & Universities Program (HBCU-UP) seeks to enhance the quality of undergraduate STEM education at Historically Black Colleges and Universities (HBCUs) as a means to broaden participation in the nation's STEM workforce. OPT-ED includes HBCU-UPs at Bennett College (Integrating Technology in Science & Math Instruction), North Carolina A&T State University (Talent-21), and Saint Augustine's College (The Living and Learning Science Retention Program).

LSAMP

The North Carolina Louis Stokes Alliance for Minority Participation (NC-LSAMP) Program is a regional Alliance comprised of eight institutions within the University of North Carolina System. A primary goal of NC-LSAMP is to significantly increase the quantity and quality of underrepresented minority students earning B.S. degrees in the STEM disciplines, and subsequently pursuing Ph.D. degrees in these fields. Since the inception of the Alliance in 1992, combined efforts of partner institutions have resulted in a variety of programs and activities geared towards enhancing student success. Major initiatives include supplemental instruction, bridge programs, undergraduate research, and summer internships. The Alliance also sponsors an annual research conference, which serves as a forum to showcase faculty-mentored research accomplishments by students. OPT-ED includes the following NC-LSAMP institutions: North Carolina A&T State University (lead campus), North Carolina Central University, the University of North Carolina at Chapel Hill, the University of North Carolina at Pembroke, Fayetteville State University, North Carolina State University, the University of North Carolina at Charlotte, and Winston-Salem State University.

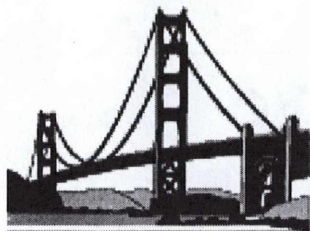
CREST

NSF Centers of Research Excellence in Science and Technology (CREST) makes available substantial resources to upgrade the capabilities of the most research-productive minority-serving institutions to promote the production of new knowledge, increase the research productivity of individual faculty, and expand the diverse presence in the SMET disciplines. OPT-ED includes a CREST program (Center for Advanced Materials and Smart Structures) at North Carolina A&T State University, which collaborates closely with North Carolina State University.

The Center for Advanced Materials and Smart Structures (CAMSS) seeks to create cross-disciplinary infrastructure that transcends departmental, institutional, industrial and governmental barriers and lends itself to the integration of research and education in the vital field of smart and advanced materials.

AGEP

The NSF Alliances for Graduate Education and the Professoriate (AGEP) Program seeks to increase significantly the number of African-American, Hispanic and Native American students receiving doctoral degrees in the sciences, technology, engineering, and mathematics. OPT-ED includes AGEP programs at the University of North Carolina at Chapel Hill (Research Education Support Program) and jointly at North Carolina State University (Minority Graduate Education Program) and North Carolina A&T State University (Student Transition and Retention Program).



BRIDGE

Bioscience Research Initiative for Doctoral Graduate Education

The National Institute of General Medical Sciences (NIGMS) through their Bridges to the Future program funded the NC State University Doctoral BRIDGE (Bioscience Research Initiative for Doctoral Graduate Education) Program in 1994. The **BRIDGE** Program aims to increase the number of researchers in underrepresented populations in the biomedical and life sciences.

BRIDGE is an innovative partnership between five campuses of The University of North Carolina system. The program supports graduate students in pursuit of the Master of Science degree at three Historically Black Colleges and Universities (HBCU'S) and promotes their entrance into biomedical and bioscience Ph.D. programs at NC State University. The BRIDGE partner institutions are:

North Carolina A&T State University
North Carolina Central University
North Carolina State University
Fayetteville State University
University of North Carolina - Pembroke

The **BRIDGE** program especially encourages applications from students who are interested in pursuing degrees in underrepresented Ph.D. areas in the biomedical and life sciences. Participants receive financial assistance during completion of their master's degree at one of the HBCU partners.

Through various activities, the **BRIDGE** program enhances faculty mentoring for master's students, provide access to specialized equipment, promote faculty research collaborations, enhanced the curricula of the partner institutions by sponsoring seminars and other professional activities.

The **BRIDGE** Program Offers:

- * Annual Salary of \$15,000 (2 years)
- * \$3500 for tuition & special research training biotechnology (2yrs.)
- * \$2000 for laboratory materials and supplies (2 years)
- * \$1,500 for travel expenses to national scientific meetings or symposia
- * Funds for travel to the annual BRIDGE Biomedical Symposium
- * Application fee waiver at NC State University for Ph.D. program

www.fis.ncsu.edu/Grad/BRIDGE

A NIH-FUNDED PROGRAM: Agenc Reference No.: 2 R25 GM 51757

BRIDGE

Bioscience Research Initiative for Doctoral Graduate Education

For more information, please contact our Program Coordinators:

Dr. Tracy Hanner
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FIRST ANNUAL OPT-ED ALLIANCE DAY

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FIRST ANNUAL OPT-ED ALLIANCE DAY

AGENDA

7:30 am – 12:00 noon

REGISTRATION (Recruiting tables should be set up by 8:00 am)
Location: McKimmon Center Lobby

8:00 am – 9:00 am

STUDENT POSTER SET-UP AND CONTINENTAL BREAKFAST
Location: Room 1
(Posters will remain on display until 5:00 pm)

9:00 am – 9:45 am

WELCOME/OPENING SESSION
Location: Room 1

Moderator:

Dr. Caesar Jackson, Interim Dean
College of Arts & Sciences, North Carolina A&T State University
Principal Investigator, Talent-21 Program (HBCU-UP)

Greetings:

Dr. Robert S. Sowell, Dean
The Graduate School, NC State University
Principal Investigator, NC Alliance to Create Opportunity through Education (OPT-ED)

**Introduction of
BRIDGE Advisory
Board:**

Dr. Duane Larick, Associate Dean
The Graduate School, NC State University
Bioscience Research Initiative for Doctoral Graduate Education (BRIDGE)
Program Director
OPT-ED Committee Member

**Introduction of
OPT-ED
Committee:**

Ms. Tangie Gray, Coordinator
North Carolina Alliance to Create Opportunity through Education (OPT-ED)

**Opening
Discussion:**

Dr. Henry T. Frierson, Professor,
University of North Carolina-Chapel Hill
Principal Investigator and Director, Research Education Support Program (AGEP)

AGENDA

FIRST ANNUAL OPT-ED ALLIANCE DAY

9:45 am – 10:00 am **BREAK**

10:00 am-12:00 noon **CONCURRENT WORKSHOPS**
Please choose one workshop per time period to attend

- | | |
|----------------------------|--|
| 10:00 am – 10:35 am | Concurrent Session I |
| Room 6 | “Making Yourself Competitive for College”
Presented by Vern Granger, Assitant Director of Undergraduate Admissions, NC State University |
| Room 3 | “Making Yourself Competitive for Graduate School”
Presented by Dr. Duane Larick |
| Room 4 | “Opportunities After Graduate School”
Panel Presentation-- Question and Answer session |
| 10:45 am – 11:20 am | Concurrent Session II |
| Room 5 | “Tips for Selecting a College Major in a STEM Discipline”
Presented by Dr. Stephen McCary-Henderson, Adjunct Assistant Professor, North Carolina A&T State University |
| Room 4 | “Graduate School Survival Skills” (OPEN TO <u>STUDENTS ONLY</u>)
Panel Presentation-- Question and Answer session |
| Room 3 | “How to Give an Effective Poster Presentation”
Presented by Dr. Duane Larick |
| Room 6 | “Understanding the NSF Graduate Research Fellowship Application Process”
Presented by Ms. Mary Anthony, Senior Program Specialist
NSF Graduate Research Fellowship Program |

FIRST ANNUAL OPT-ED ALLIANCE DAY

AGENDA

11:30 am – 12:00 noon

Concurrent Session III

Room 4

“College Survival Skills” (OPEN TO STUDENTS ONLY)
Panel Presentation-- Question and Answer session

Room 3

“How to Give Effective Oral Presentations”
Presented by Ms. Amanda Granrud, Coordinator
Writing and Tutorial Services, NC State University

Room 7

“Financing College/Applying for Financial Aid”
Presented by Ms. LaShawn Cooper, Assitant Director
Office of Scholarships and Financial Aid, NC State University

Room 5

“Financing Graduate School”
Presented by Mr. David Shafer, Interim Assistant Dean,
Graduate School, NC State University
Program Director, Minority Graduate Education Program (AGEP) and
the North Carolina Alliance to Create Opportunity through Education

12:00 noon-1:30 pm

LUNCHEON SESSION

Moderator:

Dr. Duane Larick

Invocation:

Dr. Kenneth Murray, *Associate Vice Chancellor and Dean
School of Graduate Studies
North Carolina A&T State University
Project Director, Student Transition and Retention Program (AGEP)*

**Introduction of
Speaker:**

Dr. Gloria Payne, *Chair
Division of Natural Science and Mathematics, Saint Augustine's College
Co-Principal Investigator, The Living and Learning Science Retention
Program (HBCU-UP)*

Keynote Speaker:

Dr. Donald Thompson, *Director
Division of Human Resource Development, National Science Foundation*

AGENDA

FIRST ANNUAL OPT-ED ALLIANCE DAY

1:30 pm-2:50 pm

POSTER PRESENTATIONS

BRIDGE Program Meeting (*BRIDGE Participants please go to Room 6*)

3:00 pm-5:30 pm

ORAL PRESENTATIONS

5:30 pm

RECOGNITION/AWARDS RECEPTION

**FIRST ANNUAL OPT-ED
ALLIANCE DAY**

ABSTRACTS

**FIRST ANNUAL OPT-ED
ALLIANCE DAY**

**POSTER PRESENTATION
ABSTRACTS**

SABRINA BARNES

Virginia Union
University

Modes of Vibration of a Musical Saw. Sabrina Barnes, B. S., Laurie E. McNeil, Ph. D., and Stephen B. Knisley, Ph. D. Department of Mathematics, Virginia Union University and Departments of Physics and Astronomy and Biomedical Engineering, The University of North Carolina at Chapel Hill

The musical saw is an instrument that can be played with an ordinary bow to cause the metal to vibrate and create a pitch. Modes of vibrations have been described for some instruments but are not clearly understood for the musical saw. In this study, we performed a physical analysis of the transverse vibrations of a musical saw using a mathematical model based on Euler-Bernoulli's beam equation. The mathematical model imitates the saw in the sense that it is constrained to have zero transverse displacement and zero slope at one end due to the rigid handle attached to the metal. The other end is free to only have zero displacement because there is no restriction except the hand-held support by the player. The theoretical analysis has yielded modes of vibration, which represent components of transverse displacement at all points along the length of the saw. For example, the sequence 0.781, 0.815, and 1.54 represents three different frequencies of sound for modes that were found. When graphed using MATLAB computational tools, the frequencies based on these numbers exhibited the characteristic displacements and slopes at the ends of the modeled saw that are expected from the theory as described above. Also, the frequencies were measured using Fourier transforms of digitized sound waves from a saw in which the steel was held flat. In this case, measured frequencies were similar to the frequencies calculated in the model, both showing irregular distances between the frequencies. However, when the saw was bent as is typically done during musical performance, additional frequencies were found and distances between frequencies became more regular. These results indicate modes of vibration of a musical saw are highly dependent on saw bending. The simple beam equation does not account for all of the modes in a bent saw.

KEVIN BROADNAX

North Carolina A&T State University

Photomultiplier Tube Tests of PrimEx Experiment Kevin Broadnax, Jason Perry, Laura Wharton, Jarreas Underwood, Marsha Walker, Dr. Ashot Gasparian, Dr. Samuel Danagoulian, Dr. Abdellah Ahmidouch. North Carolina A&T State University Greensboro, NC 27411. Thomas Jefferson National Accelerator Facility.

This past summer I had the pleasure of working with the PrimEx experimental group at the Thomas Jefferson National Accelerator Facility in Newport News, VA. The aim of the group was to measure the lifetime of the π^0 pion. The HYCAL prototype calorimeter was built and used in order to measure the photon energy coming from lead tungsten and lead glass detectors. Photomultiplier tubes (PMTs) were widely used in our experiment. These devices absorb photons and transform light into electric current. Various tests were needed to determine the particle gain-rate and the linearity of the PMTs. We measured the gain-rate of the PMTs by constructing a high voltage box that housed various PMTs. With low voltage generators and oscilloscopes, we were able to determine the gain-rate for the various PMTs. This is important because if PMTs take in too many particles, then certain characteristics of the PMTs, such as noise and efficiency, may be effected thus giving us incorrect results. The linearity measurements included the usage of another high voltage box. Inside this box was a PMT, filter, and a fixed LED light bulb. We used a generator to pump a low voltage current into the LED to create a soft light. The light then traveled through the filter, which was used to integrate the light from the LED, and then into the PMT. From there, the linearity was measured using an oscilloscope. Linearity is important because it gives us a mean, accurate value of the light and electric current flowing from the PMT tube. If the transmittance of the LED and it's optical density was not constant, then linearity could not have been established. Our results were conclusive and stable. Our experiment still continues to this day, and I'm extremely content with our work.

VERNITA BRYANT

**North Carolina A&T
State University**

Receiver INdependent EXchange Format. Vernita Bryant, Dr. Derek Dunn. North Carolina Agricultural & Technical State University, Greensboro, NC 27411

Global Positioning Systems (GPS) provides precise location, velocity, altitude, and time information worldwide, which is based on data transmitted from a formation of 24 satellites in 6 orbits. The GPS data is gathered and a fixed reference station determines a correction factor for the satellites within the area and sends it to the Differential GPS (receivers within the area). These GPS receivers put out the same information, but each manufacturer has its own respectable file format identical to save storage space for their particular receiver. The processing software can read its own format but not that of others.

Therefore, RINEX was developed by the Astronomical Institute of the University of Berne. In May of 1989 it became the most recommended format for the easy exchange of GPS data to be collected. RINEX is an ASCII (American Standard Code for Information Interchange) format that represents the Reciever Independent EXchange format. RINEX has been designed with many requirements. Just to name a few, it has easy readability by software and users alike, minimum-size storage files, and no redundancy. Recently the format consists of six ASCII file types, but only three has been defined to date. Those three are observation, broadcast navigation message, and meteorological data files.

EUGENE CAMERON

UNC-Chapel Hill

Preparation and Characterization of Cobalt Doped TiO₂ Films. Eugene Cameron, Dr. Ram Katiyar. University of Puerto Rico, Recinto Rio Piedras. 787-764-0000, San Juan, Puerto Rico 09323.

The study of ferroelectric films is important because of their possible integrated electronic devices. Optically transparent TiO₂ films are particularly useful in microelectronics, dielectronic resonator application, water waste purification, and inorganic membrane catalyst support. Thin film optical devices are attractive because of the possibility for monolithic integration with the electronic and optoelectronic devices and systems. Thin films also offer the possibility for increased speeds, reduced operating voltages, and enhanced efficiency. In order to integrate these devices one must understand the properties of these new devices and materials. High optical transparency in the visible wavelength region, high refractive index, and low extinction coefficient are essential properties for optoelectronic devices. Titanium Oxide films (TiO₂) have valuable properties such as high refractive index, excellent transmittance in the visible and near IR frequency, and high chemical stability. Therefore they are extensively used in anti-reflection coating, sensors and photocatalyst for electrical and optical applications. TiO₂ films were prepared by a spray pyrolysis method and deposited over a glass substrate. The titanium oxide films were doped with Cobalt at 1%, 5% and 10%. The phase formation and structural behavior were studied using X-ray diffraction and micro Raman analysis. The composition was studied using XPS analysis, and optical properties were studied using XPS analysis, and optical properties were obtained through UV visible spectroscopy. Anatase proved to be the principal phase change. The Raman spectroscopy suggests that Cobalt was entering into the lattice structure. The optical measurements proved that this material shows promising uses in optical protection from UV rays because of its low transmission in UV range.

SHAUN DALTON

**North Carolina A&T
State University**

Tetrahedral Extrusion Algorithm. Shaun Dalton, Stanford University faculty and NASA scientists including Cynthia Bruyns, Anil Menon, Dr. Xander Twombly, Dr. Jeffery Smith, and Dr. Kevin Montgomery. NASA Ames Research Center, Mountain View, CA 94305 and the Stanford University Biocomputation Center, Palo Alto, CA 94305, Bobby Barnes

This research discusses the implementation of a tetrahedral extrusion algorithm. This algorithm expands the capabilities of the software called Spring by extending its capabilities to model objects operated upon during surgical procedures. These virtual representations of animate objects such as hearts, skin, veins, and etc. are given more realistic characteristics as a result of the extrusion method presented in this paper. This extrusion method adds depth to an object while optimizing the performance of the program because it checks for errors in the extrusion depth entered by the user and in the modeling of the object itself. This presentation discusses the development of the tetrahedral extrusion algorithm.

JAMEL ELLERBEE

Southeast Raleigh High School

UV(HPUV) Photochemical Reaction of Soybean Oil, Ellerbee, Jamel¹, Garrett, Harris² and Kurt A. Garrett³, ¹Southeast Raleigh High School, Raleigh, NC, and ²Millbrook High School, Raleigh, NC, ³Department of Natural and Physical Sciences, Shaw University, Raleigh, NC.

Soybean oil has been used to make products ranging from cooking oil to candle wax. Chemistry related to the use of soybean oil is ever expanding and a variety of sophisticated and simple approaches have added to soybean oil's commercial success. Of particular interest is epoxidized soybean oil (ESBO) since the product has been made useful as an additive in car waxes among other things. The classical preparation of epoxides requires the combination of a halogen and an alkene in the presence of water. Our goal is to eliminate the use of dangerous gases like bromine and to make epoxy-type compounds in one step. It has been reported that a one-step synthesis of ESBO uses curative amines. Only aromatic amines such as -toluenediamine, p-phenylenediamine, and diaminocyclohexane and aliphatic amines such as triethylenetetramine, diaminobutane and methylenediamine were used. Heat was added to initiate the reaction. We proposed the use of High Performance Ultraviolet Light (HPUV) lamps to generate a supply of radicals that would be sufficient enough to form new soybean oil derivatives in one-step (batch) reactions.

EGBE ENI

NC State University

Energy Analysis of the Yarn Production Process. Egbe Eni, Bryan Wilson, Jeffery Jones, and Perry Grady. North Carolina State University, Raleigh, NC 27695

Ring spinning, Rotor spinning, and Air Jet spinning are three primary methods of yarn production used in today's industries. Each specific yarn production method encompasses certain machines and processes the fiber must be subjected to before yarn formation is complete, for example: opening, carding, drawing and lapping. Each process employed consumes various amounts of energy depending on certain parameters such as; the amount of motor horsepower required, the weight and amount of product produced, the speed the product is fed into the machine, as well as the speed of the product exiting the machine. Every additional process adds to the total amount of energy required to produce the final product. By analyzing each process one can determine the optimal machine settings required to decrease energy usage in yarn plants.

Energy models were developed for each process using C++ and Excel. These models and equations were translated into VB script and Html, which are now available on line. New codes have been developed using general math to create a plant wide summary analysis providing the user with a total KW expenditure for both, the plant as a whole as well as each individual process. This research is part of a major effort to create a national textile energy consumption database that can be used by the industry to benchmark and reduce its energy costs, which is becoming increasingly important as the costs of energy increases.

NOELLE HUTCHINS

UNC-Chapel Hill

Regulation of Endothelial Cell Migration by Methylation of Rho GTPases, Noelle Hutchins, Qing Lu, Ph.D., Julie Newton, B.S., Elizabeth Harrington, Ph.D., Sharon Rounds, M.D., Pulmonary Vascular Biology Research Laboratory, Brown University Medical School, VA Medical Center, Providence, RI

Endothelial cell migration is essential for repairing vascular injury. Rac-1, a family member of Rho GTPases, has been shown to stimulate cell migration by regulating stress fiber formation and focal adhesion complex organization, among other effects. Post-translational modification of Rac-1 by prenylation and carboxymethylation is important in regulating its biological functions. Our previous studies have shown that inhibition of isoprenyl-O-carboxyl methyltransferase (PCMT) decreased endothelial cell migration. In this study, we further investigated the role of PCMT in endothelial cell migration by analyzing clones of bovine pulmonary artery endothelial cells (BPAEC) which stably overexpress PCMT or GFP. We found that PCMT overexpression increased endothelial cell migration compared with normal BPAEC. However, there was no increase compared to BPAEC cell lines which overexpress GFP alone. Analysis of immunocytochemistry indicated that PCMT overexpression increased stress fiber formation and vinculin localization in focal adhesion complexes. Immunoblot analysis showed that PCMT overexpression does not change the protein level of Rac1, but increases Rac1 activation, as assessed by binding to GTP. These results suggest that carboxymethylation of Rac1 by PCMT significantly increases endothelial cell migration, stress fiber formation and Rac1 activation.

MICHAEL KELSO

UNC-Chapel Hill

Analysis of the Replication Timing of a Contig from Human Chromosomal Band 22q13. Michael Kelso, Bruna Brylawski, Stephanie Cohen, Marila Cordeiro-Stone, David Kaufman, Dept. of Pathology and Laboratory Medicine, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599

DNA replication is initiated in a cell at specific sites along chromosomes at the beginning of S phase. The process of initiating DNA synthesis in higher eukaryotic cells is not well understood, but it is presumed to start at one or a few origins of DNA replication mostly near genes. There is evidence that sites replicating very early in the S phase are more susceptible to damage when treated with carcinogens. Several chromosomal bands, including 22q13, have been found to contain regions that replicate very early in S phase in normal human fibroblasts (NHF1 cells). However, chromosomal band 22q13 is several megabases in length, and it is not known exactly which part of the band replicates very early in S phase. We chose an 88kg contig (GenBank number z82244) that reportedly maps to chromosomal band 22q13 to begin our analysis. NHF1 cells were synchronized at the beginning of the S phase by confluence arrest followed by incubation in aphidicolin. DNA from the NHF1 cells was collected every hour for the first four hours of S phase, and newly replicated DNA was isolated by CsCl gradient centrifugation. Using the synchronized DNA from each 1-hour interval, quantitative PCR was used to determine a more precise timing of replication for this contig. The data presented here indicates that this contig from 22q13 is very early replicating.

WANIDA LEWIS

Saint Augustine's College

Extraction and Application of Antioxidant Compounds Using Muscadine (*Vitus Rotundifolia*) Pomace.
Wanida Lewis, Ruth Hawkins, Trivette Vaughan, Dr. Leon Boyd. St. Augustine's College, Raleigh, NC 27610.

Antioxidants contained in fruits and vegetables are known to be effective in preventing the oxidation of oil-containing foods and in preventing the damage to body tissues and organs due to the presence of free radicals. As free radicals are involved in the occurrence of several degenerative diseases. Including atherosclerosis, coronary heart diseases, and arthritis, the stabilization of antioxidants in processed foods and increasing their dietary consumption have become major goals of research scientists in the food and biomedical sciences. Therefore, the objectives of this study were to optimize the extraction of antioxidants from a wine pomace and to examine their efficiency in preventing the oxidation of lipids in a model system and a food application. Muscadine (*Vitus Rotundifolia*) pomace obtained from the processing of juice into wine was separated into seed and skin fractions, dried, delipidized, and reacted with Ethyl Acetate (EA) and water, followed by partitioning, and concentration by drying. The antioxidant properties of extracts was compared to that of commercial antioxidants as determined by total phenol content, oxygen radical absorbance capacity (ORAC), conjugated diene (CD), and oxidative stability instrument (OSI). A reconstituted pomace puree (without seeds) was used in fruit bread followed by the determination of sensory score and antioxidant activity prior to and after cooking. Results indicated that though both seed and skin contained significant antioxidant activity, EA extracts of the skin were 61% more effective in reducing oxidation in a lipid model system. Comparison of antioxidant activity of extracts to two commercial antioxidants (TBHQ- tertbutylhydroquinone and BHT- butylated hydroxyquinone) indicated that when added at equal concentrations the extracts obtained 44% of the efficiency of TBHQ. However when skin extracts were added at higher levels, they exceeded the TBHQ effectiveness by more than 20% whereas both seed and skin extracts exceeded the antioxidant activity of BHT. Puree supplemented fruit bread added textural and taste qualitative that were acceptable to an informal taste panel.

FREDERICK LIVINGSTON

NC State University

Remote Control Interface for Evolutionary Robotics. Frederick Livingston, Dr. Edward Grant. North Carolina State University, Raleigh, NC 27695

Evolutionary Robotics is a technique for automatic creation of autonomous robots. These autonomous artificial organisms develop their own skills in close interaction with the environment without human intervention.

The Center for Robotics and Intelligent Machines (CRIM) at North Carolina State University (NCSU) has developed a colony of Evolutionary Robots. This miniature robot uses vision-based sensors, wireless communication, and knowledge based algorithms for navigation and control. These robots (Evbots) may be used to search and rescue operation in environment unsuitable for humans.

Evbots behave in a similar manner as humans. Humans are not born with the ability to walk and talk. It is believe that visual demonstration plays an important role for human progression of these tasks. When Evbots are initiate they also know very little about their environment. Since these robots are autonomous the robot must learn how to maneuver around obstacle, such as wall.

The objective of the research is to introduce visual learning to the Evbots by providing a remote control interface with the colony. Software was developed to allow a universal joystick control to interact with the network control robots. The Joystick controller use DirectX and C++ Sockets to communicate with the robots' onboard Linux based system. The robot would then gather information from the robot's Linux socket and passed it the BasicX stamp controller. The BasicX stamp interprets the data and turn on the corresponding motors to drive the robots.

LEROY MAGWOOD

Benedict College

Chemistry of asphaltene solubility fractions as probed by UV-vis spectroscopy

Leroy Magwood

Benedict College

Dr. Peter K. Kilpatrick, Keith L. Gawrys*

Asphaltenes from two different crude oils (Arab Heavy and B6) were partially precipitated in mixtures of heptane and toluene to produce 20-30 different solubility fractions. The individual fractions were analyzed chemically by Fourier Transform Infrared Spectroscopy (FTIR) to determine relative amounts of carbonyl and other polar functional groups (C, H, N, S, O). Several dilute solutions of the asphaltene fractions dissolved in toluene were prepared and measured using UV-vis absorption spectroscopy. The molar extinction coefficient (ϵ) was calculated at various wavelengths by applying the Beer-Lambert law. Fractionation appeared to concentrate the most polar species into the least soluble sub-fraction as indicated by elemental analysis. UV-vis results indicated that the least soluble fractions had lower ϵ than the more soluble fractions, possibly due to a lower aromaticity (higher H/C ratio). The fractions with a lower ϵ constituted the least soluble 10 % of the whole asphaltenes and were shown by small angle neutron scattering to form the largest aggregates in solution. The less soluble asphaltenes contribute the majority of species responsible for aggregation and likely cause many petroleum production problems such as pipeline deposition and water-in-oil emulsion stabilization.

* NC State University, Department of Chemical Engineering

CRYSTAL MOORE

**North Carolina A&T
State University**

The Use of Immobilized Bifidobacteria in Manufacturing

Crystal Moore

North Carolina Agricultural and Technical State University

Agricultural and Biosystems Engineering

Dr. Shahbazzi (mentor)

Manufacturing produces 325 billion gallons of waste and by-products. Whey is a by-product of cheese production. Whey contains a high quantity of lactose and other nutrients, which can be easily utilized by lactic acid bacteria to produce organic acids such as lactic and acetic acids and value added products such as vitamins, amino acids, and bacteriocins. Bifido is the bacteria that is being used in this research. Bifidobacteria has the ability to sensitize different amino acids such as histidine, and vitamins including B complex, and organic acids. The purpose of this research is to show how bifidobacteria can help reduce waste in agricultural areas including food, animal sciences and agricultural engineering. The project involves taken alginate beads, which are made of a calcium chloride solution heated up to boiling. The alginate is ran and then dropped into the calcium chloride that in sitting in an ice bath. Out of 100 milliliters 1500 beads are produced. The beads are then autoclaved and inoculated with the bacteria. The beads and cheese whey are poured into a bioreactor that contains a spiral sheet. Samples will be collected every six hours. The samples collected will be measured for pH level and lactic acid production.

DAMARIS MOTURI

Shaw University

Susceptibility of Interspecific f1 Hybrid Pine Trees as Compared to their Susceptible and Resistant Parents. Damaris Moturi¹, Maxine T. Highsmith, and Larry Lott², ¹Department of Natural and Physical Sciences, Shaw University, Raleigh, NC, ²USDA Forest Service, Southern Institute of Forest Genetics, Saucier, Mississippi

Tip moth damage among families of parent pine species and their interspecific F1 hybrids was quantitatively assessed in a recent coastal planting in North Carolina. Three slash pine (*Pinus elliotti* var *elliotti* Engelm.), two loblolly pine (*Pinus taeda* L.), and four interspecific F1 hybrid pine families were used. Their phenotypes supported a dominant or partially dominant mode of inheritance for susceptibility. A follow up study was conducted in Mississippi at two different locations approximately 98 miles apart. This study included 19 families at both locations of which six were slash pines, two were loblolly pines, three were shortleaf (*Pinus echinata* Mill) pines, and eight were interspecific F1 hybrid pines. As in the earlier study, the phenotypes of the F1 hybrids in this study supported a dominant or partially dominant mode of inheritance for susceptibility.

ANNE NGUNJIRI

Shaw University

High Performance UV(HPUV) Inactivation of *E. coli*. Anne Ngunjiri-and Kurt A. Garrett, Department of Natural and Physical Sciences, Shaw University, Raleigh, N.C.

The use of ultraviolet light for inactivation of microorganisms is well documented in the literature. Ultraviolet light used for inactivation is sometimes called germicidal UV or UV254 (the specific wavelength known to have the most lethal effect on bacteria, fungi and viruses). In the late 1970's and early 1980's a popular strategy employed the use of UV light for making animal vaccines. The idea was to inactivate a viral strain with germicidal UV then reintroduce it into tissue or blood. The hope was that mammalian cells would respond by making antigens and antibodies. Research in this area, though moderately successful, proved the theory. Recently, herpes simplex virus (HSV) was similarly inactivated and the procedure gave surprising results. In the HSV experiments High Performance Ultraviolet (HPUV) lamps were used in lieu of conventional germicidal UV lamps. The inactivation times were radically improved. Bacterial inactivation using HPUV was noted in these experiments but quantitative responses have not been documented in the literature. We are proposing the use of HPUV for inactivation of *E. coli*. Our studies will measure inactivation initiation, inactivation optimum and hyper-inactivation.

JASON PERRY

North Carolina A&T State University

Lifetime of the Neutral Pion via the Primakoff Effect. Jason Perry, S. Danagoulian, A. Ahmidouch, A. Gasparian. NCA&T State University, Greensboro, NC 27411.

The nucleus of an atom is well understood as far as what are the particles which form it. But the structure and the nature of these particles are not as well explained or observed. One of such particles is the neutral pion. The lifetime of the neutral pion is a property that is not well known, though it has a fundamental implication in the understanding of the nature of the nuclear structure. The PrimEx collaboration at Thomas Jefferson National Accelerator Facility (Jefferson Laboratory) has an objective to measure the lifetime of the neutral pion with high precision. The experiment's name comes from a phenomenon known as the Primakoff effect. The Primakoff effect is a process of beam particle scattering off the target nucleus at small angles (forward scattering). In this process the scattering occurs in the electromagnetic field of the nucleus. In the reaction of pion production via the Primakoff effect, the beam photons are directed to the atomic nuclei producing neutral pions at very small angle. Produced pions later decay into two more photons. If we know the energy of the initial photons, the energy and the emerging angles of the decay photons, then we can calculate the lifetime of the pion.

This experiment provides high precision measurements and therefore needs suitable equipment. One is the Hybrid Calorimeter (HYCAL), the detector used to observe the decay photons. A Light Monitoring System (LMS) is used to ensure a correct measurement of the energy and the angles of the photons. My summer research deals with the preparation of the prototype calorimeter. I was involved also in building and testing of the LMS. The prototype calorimeter has been built this summer and the LMS has been attached to it for the beam test.

The experiment PRIMEX is anticipated to run in the second half of 2003.

DAVIDA ROBINSON

**North Carolina A&T
State University**

The Stability of RNA of the Arabidopsis Plant as a Component of Thermal Profiling Techniques: A Molecular Biology Assessment. David Robinson, Anna-Lisa Paul, and Robert Ferl. SLSTP Program: Space-Flight Simulation Emphasis Group, NASA-Hangar L, Kennedy Space Center, FL.

Typically Ribonucleic Acid is stored at a room temperature of -80°C to preserve integrity. This storage temperature is not always available in a Space Flight situation. Various thermal profiles for storing harvested tissue such as in liquid N_2 (-196°C), -80°C , -20°C and room temperature were used as a comparison for various space flight simulations. The Molecular Biology Assessment evaluates the various thermal-profiling techniques in their stability to sustain the stability of RNA of harvested *Arabidopsis thaliana*, in both simulated flight and ground controls. A set number of samples were stored in the new, uncharacterized stability agent, "RNAlater". Results can be used for further investigation into the best protocols for handling plants on the International Space Station.

PAMELA SCOTT

UNC-Chapel Hill

Prokaryotic Translation Initiation Factor-2 Domains Responsible for 30 S Ribosomal Subunit Recognition.

Pamela Scott, Angie Coursey, & Dr. Linda Spremulli. Department of Chemistry, University of North Carolina at Chapel Hill, Chapel Hill, N.C. 27599

The goal of this project is to investigate the mechanism of the initiation of protein synthesis in prokaryotes. Initiation factor-2 (IF-2) plays a major role in the initiation phase of protein synthesis by promoting the binding of the initiator tRNA, fMet-tRNA^{Met}, to the 30 S ribosomal subunit. Domains I and II of IF-2 have been shown to specifically interact with the 30 S ribosomal subunit during translation initiation. In order to verify this observation, the genetic information for domains I and II of *E. coli* IF-2 was amplified using the polymerase chain reaction (PCR) for cloning into the vector pET21. This DNA sequence was engineered to include a 10 amino acid *c-myc* tag located at the C-terminus for detection through immunological analysis. An expression construct for domains I and II of IF-2 was prepared to verify that these domains specifically interact with the 30 S ribosomal subunit during translation initiation. Ribosomes (30 S) and the expression construct will be used in binding experiments to measure the interaction between these two components. This project is being carried out to further investigate the differences between the mechanism of initiation of protein synthesis in prokaryotes and eukaryotes.

AMMA SEMENYA

UNC-Chapel Hill

Umbilical Cord Blood and Gene Transfection. Amma Semenya, William Walton, Cliff Muriello, Suzanne Kirby.
UNC-Chapel Hill

Umbilical cord blood (UCB) transplants have been shown to be advantageous compared to bone marrow and peripheral blood stem cell transplants. UCB transplants have lower risks for graft versus host disease, higher percentages and quality of stem cells, increase the donor pool, and decrease the time to find a donor. However, UCB transplants also have longer engraftment times for myeloid cells and platelets and the graft failure rates are higher. In previous work done by the Kirby laboratory, it has been shown that in a murine model a truncated erythropoietin receptor transgene (tEpoR tg), along with an initial epo administration, enhances bone marrow engraftment without loss of stem cell function. The laboratory has been working to determine whether the same transgene (tEpoR tg) will enhance engraftment of umbilical cord blood cells. At present, the laboratory is working to produce a vector containing the tEpoR tg to transfect the UCB cells. The laboratory started with three plasmids obtained from other laboratories and these three plasmids are being used to produce retroviral and lentiviral vectors containing the tEpoR tg that will be used to transduce the UCB cells. The pbERG plasmid, containing a human beta actin promoter (hubA)-tEpoR-IRES-GFP, was transfected into NIH/3T3 cells, and this plasmid was shown not to produce green cells. The pScGn plasmid, containing hubA-GFP, was also transfected and resulted in green cells. We determined that the pbERG plasmid was expressing the tEpoR gene but not GFP due to an error in the IRES. To test this, the pScGn plasmid, containing hubA-IRES-GFP, was transfected and shown to have green cells. It was determined that the pbERG plasmid was still poorly expressing green cells possibly due to relatively weak promoter strength and/or instability of the messenger RNA. We are currently checking tEpoR compared to GFP message to evaluate these possibilities.

SALIMAH SHAKIR

Bennett College

Banana Chemistry: Analysis of Serotonin, Ascorbic Acid, Sugar, and Potassium in Ripened Fruit, and Changes in Color and Texture of Peel During Storage Under Different Conditions. Shakir, S., Strickland, C., West, S., and Price, L. C. Bennett College, Greensboro, NC 27401

Bananas provide a rich source of vitamins including antioxidants such as vitamin C (ascorbic acid), minerals including potassium and zinc, the amino acid serotonin, and the sugars glucose and fructose. Antioxidants may reduce the risk of cancer, stroke, and heart attack. Potassium helps maintain fluid balance in the body. Zinc may protect against prostate cancer. Serotonin works as an anti-depressant. Simple carbohydrates (sugars) supply fuel energy. This study was conducted to determine levels of nutrients in bananas ripened under different conditions, and to observe color and texture changes during storage. Serotonin analysis was performed on a Shimadzu Spectrofluorophotometer, RF-5301PC. Ascorbic acid was quantified using the Merck Reflectoquant. Sugar “total solids” was measured using a Baume Hydrometer. Potassium was quantified on a Shimadzu Atomic Emission Photometer, AA-6701F. Color profiling was performed using a Shimadzu UV/Visible scanning spectrophotometer, UV-2401PC, equipped with a MPC-2200 color analyzer. Texture was analyzed on a Micro Systems TA-XT2i[®] Texture Analyzer with a conical puncture probe. Refrigeration protected serotonin from degradation but resulted in decreased levels of vitamin C. Sugar levels were highest in bananas ripened at ambient conditions. Potassium ranged from 34 to 51 ppm. All bananas exhibited a steady decrease in lightness of peel color with time. The refrigerated banana remained the firmest fruit.

KATHERINE SHIVERS

Bennett College

Population dynamics and persistence of genetically modified rhizobia in the boreal climatic zone. Katherine L. Shivers, Jyrki Pitkääjärvi, and Kristina Lindström. University of Helsinki, Helsinki, Finland FIN-00014.

The use of genetically modified micro-organisms (GMMs) in the open environment has raised many questions about their potential environmental hazards. The recombinant DNA in the GMM or transgenic plants can potentially be transferred to any of the organisms that are in close proximity to them. This creates a great risk in passing genetic material to targets that produce undesired effects, such as resistance to antibiotics. Deliberate release with GMMs should be based on sufficient knowledge of the host, the modified organism, and its behaviour in the environment to insure proper management of the organism.

A four-year small-scale field experiment started in June 2000. It consists of 42 watertight lysimeters, which have been filled with agricultural or diesel-oil polluted (3000 ppm) soil. The model organism is *Rhizobium galegae* strain HAMBI 540 (wild type), which specifically infects goat's rue (*Galega orientalis*). It has been chromosomally tagged with *gusA21* or *luc* marker genes.

To test the effectiveness GMMs, smaller scale experiments would first have to be tested based on two aspects of this project. On aspect, the population dynamics, deals with the population of the genetically altered bacteria inserted into the soil versus the pre-existing soil bacteria. Phase two of the project test the vertical movement of the bacteria. If the bacteria is found to move through the soil via water, then the new species could possibly contaminate ground water. Such a contamination could lead to serious biological hazards. Yet, if found to be harmless the environment, GMMs could yeild possible success in the process of bioremediation.

DION STALLINGS and STACY RAYNOR

**North Carolina A&T
State University**

Ashtech G8 GPS OEM Board. Dion Stallings, Stacy Raynor, Dr. Derrek Dunn. North Carolina A&T State University, Greensboro, NC 27411

Products and applications based on the need of an item or person on the earth's surface represents one of the fastest-growing segments in the global communication market. Billions of dollars are being spend to install, expand, and upgrade existing wireless geo-location networks throughout the world such as Cellular Telephone Positioning using Global Positioning System (GPS), Time Synchronization, and Smart Farming using GPS to aid the planting of crops and the placement of fertilizer. The device that is used in our research is the Ashtech G8 GPS OEM Board, which gives the RF interface and the power input/output signal parameters. The G8 GPS OEM Board performs the need for a low-cost, high performance GPS sensor, where positioning is apply in situations such as vehicle navigation and personal asset management which involves tracking cars, boats, people, etc). The software used provides precise position tracking in extreme environments such as valleys and mountain area. Our poster will present experiments used to determine the ability to acquire a true position versus time.

CHRISTINA STRICKLAND

Bennett College

A Spectrum Analysis by HPLC of Hydrolyzed Quercetin Glycosides in Root Vegetables: Potato, Garlic, and Varieties of Onion. By Strickland, C., Shakir, S., West, S., and Price, L. C. Bennett College, Greensboro, NC 27401

Quercetin is a naturally occurring flavonoid found in plants such as onions, apples, berries, and buckwheat. Its structure contains the common flavone nucleus: two benzene rings linked through a heterocyclicpyrone ring. There are numerous health claims associated with quercetin. Two are the alleviation of allergies by inhibiting histamine release, and the prevention of cancer due to its substantial antioxidant activity. The objective of our study was to quantify quercetin in root vegetables to determine any differences between vegetable types or varieties.

Quercetin flavonoid content was determined in the root vegetables potato, garlic, and several varieties of onion. Quercetin flavonolglycosides were hydrolyzed with acid to produce the quercetin aglycone. Quercetin was separated from other flavones and interfering substances in root vegetables by reversed-phase HPLC. The aglycone was quantified against a pure quercetin (3,3',4',5,7-pentahydroxyflavone) reference standard. Yellow and Vidalia variety onions contained the highest amounts of quercetin. Garlic and red "Spanish" onions contained lesser but significant amounts. Quercetin was not detected in potato or the white and Walla Walla variety onions.

CURTIS WEBSTER, JR.

UNC-Chapel Hill

Video Browsing Interfaces for the Open Video Project. Curtis E. Webster, Jr., Gary Geisler, Barbara Wildemuth, Anthony Hughes, and Gary Marchionini. School of Information and Library Science, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-3360

In today's environment, few techniques are available to facilitate searching, reviewing, and retrieving specific items from on-line video collections. The Open Video Project is an on-going effort to develop an open source digital video collection that can be used for various research purposes, such as testing face recognition algorithms, designing multimedia interfaces, or developing video indexing techniques, while also offering highly selective tools for searching and browsing video for scientific, educational, or recreational means.

To achieve this goal, we are currently conducting a series of studies to evaluate the advantages and disadvantages of different types of video surrogates. Specifically, we are testing slideshows (keyframes presented at 4 frames per second), storyboards (same keyframes displayed in a table format), and fast forwards (entire video shown at a fraction of original time). The slideshows and storyboards are accompanied by text or audio keywords. From these results, an interface, *AgileViews*, will be designed to provide users with the opportunity to move from high-level overviews of the entire video collection to previews of specific segments by manipulating various indexes that describe visual and audio features such as human faces, colors, motions, and sounds, as well as words.

All the surrogates tested in this study are candidates for further development. The weakest was the slide show with text keywords because of the conflict between the still text and the moving images. The results of the fast forward surrogate are the most interesting and deserve further research.

MONIQUE WILLIAMS

NC State University

***In Vitro* Selection of RNA Aptamers That Bind Human Telomeres** Monique Williams and Dr. Michael Jarstfer, University of North Carolina, Chapel Hill, NC 27599

Telomeres, which are at the ends of chromosomes, erode every time a cell divides. They are double-stranded except for a short single-stranded 3' overhang that contains continuous repeats of guanine-rich sequences. In humans, the telomeric sequence is $[\text{TTAGGG}]_n$ and its double-stranded regions ranges in lengths anywhere between 5000 and 20,000 base pairs. The human telomeric sequence has the ability to form a variety of four-stranded structures called G-quadruplexes because of the abundance of the guanine nucleotide. Telomerase, an enzyme whose substrate is the 3' end of the chromosome, counteracts the natural process of telomere erosion. It has been found that: 1) G-quadruplexes inhibit telomerase and 2) that a stabilized quadruplex structure can prevent telomere maintenance. The goal of this research is to determine if G-quadruplexes exist on chromosomes and in particular at the telomere. To test this hypothesis, we seek to identify RNA molecules that specifically bind G-quadruplexes formed by the human telomeric-DNA sequence. We are selecting G-quadruplex binding RNA aptamers from a library of about 10^{13} sequences. After four rounds of selections, the percent of RNA molecules that bound to the G-quadruplex has increased from less than 0.2% to 2.6%. This suggests that we are enriching for G-quadruplex specific binders. Successful completion of these studies will identify a unique DNA:RNA interaction and provide a novel reagent for further investigations of the telomere structure.

KYHEKA WRIGHT

Bennett College

Structural Modification and Syntheses of Substituted Benzenearsonates “ Chicken Feeds”. Kyheka L. Wright, Tiana V. Curry, and Adedoyin M. Adeyiga. Bennett College, Greensboro, NC 27401

Human exposure to feed additives, p-arsanilic acid (4-nitrobenzenearsonic acid), roxarsone (4-hydroxy-3-nitrobenzenearsonic acid) and nitarosone(4-nitrobenzenearsonic acid) are of great interest due to the chemical reactivity of these compounds. Fed to chickens and swine in combination with other compounds to promote weight gain, these feeds undergo bioactivation either to their reduced, N-acetylated or N-hydroxylated derivatives, all of which are known tissue toxins and mutagens.

The objectives of our work therefore are (i) to acetylate p-arsanilic acid using a standard procedure (ii) to reduce roxarsone using different reducing agents and (iii) to reduce nitarosone using different reducing agents.

While the N-acetylation of p-arsanilic acid succeeded with over 85 % yield, the reduction of roxarsone was accomplished under a very harsh condition with moderate yield and nitarosone reduction has so far proven difficult.

MICHAEL WRIGHT
and
ANGELA MARKS

**North Carolina A&T
State University**

Using A GPS Receiver as an Effective Means of Navigation. Michael Wright, Angela Marks, & Dr. Derrek Dunn. North Carolina A&T State University, Greensboro, NC 27411

The Global Positioning System (GPS) is a radio-navigational system that consists of 24 satellites and their ground stations. This worldwide form of navigation is funded and controlled by the U.S. Department of Defense. Despite the high amount of civil users of this navigation system, it was initially designed for and is still used by the U.S. military. The GPS receiver has the ability to compute position, velocity, and time. Position is computed in three dimensions, X, Y, & Z, while time is measured by the receiver clock. This unique device is basically used for navigation, tracking, mapping, determining location, and timing. The purpose of this research is to determine the accuracy of the measurements taken by an Ashtech G8 Global Positioning System receiver in comparison to those associated with a local area road map. The poster will also present the various errors that occur when GIS and GPS are intergrated together to perform map navigation.

**FIRST ANNUAL OPT-ED
ALLIANCE DAY**

**ORAL PRESENTATION
ABSTRACTS**

JOSE ALVELO

United States Army

Bio-Defense Applications of Nucleic Acid-Based Biosensor Technologies for Rapid, Specific, and Sensitive Identification of Bacterial and Viral Targets. Jose I. Alvelo, Sanjiv R. Shah¹, Misty H. Lindsey¹, Janet Nowakowski¹, Robert Dorsey¹, Mark Karavis², Michael T. Goode¹, and Alan W. Zulich¹.

Biosensors Team, Edgewood Chemical and Biological Center,

¹US Army Soldier Biological and Chemical Command, ²Science and Technology Corporation

The mission of the Biosensors Team is to test and evaluate cutting-edge technologies available from commercial, academic, and governmental sources that demonstrate potential for rapid detection of Biological Warfare agents. These technologies are assessed for their application to sample processing, Nucleic Acid-Based Bioanalysis, and Immunological Bioanalysis. To this end the biosensors team has optimized BW detection assays for several platforms, such as: Cepheid's Smart Cycler, Idaho Technology's Ruggedized Advanced Pathogen Identification Device (R.A.P.I.D.), Lawrence Livermore Laboratory's Hand-Held Advanced Nucleic Acid Analyzer (H.A.N.A.A.), Perkin Elmer's PE7900HT, IGEN International's ORIGEN, and other platforms in early developmental stages. Most of the effort towards optimization of nucleic acids has relied on TaqMan PCR Technology. However, recent advances in the field of genomics, have propelled our team into new PCR and Isothermal chemistries that could augment or replace the current protocols. Currently, there are several PCR-based technologies under evaluation, such as; Molecular Beacons, Scorpion Primers, and Dual Probe Hybridization FRET, and Isothermal Chemistries, such as; Invasive Signal Amplification, Branched DNA, Strand Displacement Assay, Nucleic Acid Sequence-Based Amplification, and Self-Sustained Signal Replication. Our ultimate goal is to find the technology or combination of technologies that will allow the most sensitive, rapid, and reliable detection of BW agents possible and have the technology transferred for field use.

MANZA ATKINSON

North Carolina A&T State University

Template-Directed Synthesis of a Metal-Organic Square. Manza Atkinson, Tamara D. Hamilton, Giannis S. Papaefstathiou, Leonard R. MacGillivray. North Carolina A&T State University, Greensboro, NC 27411, University of Iowa; Iowa City, IA.

Previous attempts to synthesize organic molecules in the solid-state have not been as effective as the liquid phase. In solution prior to crystallization, molecules undergo subtle demands of weak intermolecular forces, which hinder the crystal arrangement necessary for a reaction. The route of solid-state organic synthesis has rarely been taken. Chemists have overlooked the synthetic freedom of the solid-state that is unattainable in a liquid solution. Using the 'topochemical postulate', we have demonstrated an ability to direct solid-state organic reactivity to conduct a molecular synthesis by design. Our method for controlling [2 + 2] photoreactivity in the solid state utilizes molecules that function as linear hydrogen bond templates. Such molecules, using principles of molecular recognition and self-assembly, provide an ability to preorganize two molecules within a discrete molecular complex for reaction. With this in mind, we have synthesized a supramolecular polygon in the shape of a square using a product obtained from our solid-state organic synthesis. Specifically, a synthetic linear template based on resorcinol was used to direct a regiocontrolled synthesis in a molecular solid, 2(4-Cl-res)·2(2,4-bpe) (where: 4-Cl-res = 4-chlororesorcinol; 2,4-bpe = trans-1-(2-pyridyl)-2-(4-pyridyl)ethylene), to give a product. The product, *rctt*-1,2-bis(2-pyridyl)-3,4-bis(4-pyridyl)cyclobutane (*rctt*-2,4-tpcb), assembles with a transition-metal-ion and copper(II)hexafluoroacetyl acetate hydrate, [Cu(hfacac)₂·H₂O], to give a structure, [Cu(*rctt*-2,4-tpcb)₂(hfacac)₄], that conforms to a square.

JAMAICA BARNETTE

North Carolina A&T State University

Analysis and Implementation of power stage of a Fly-Back DC/DC converter operating in Continuous conduction mode. Jamaica Barnette, Bassirou Sock, Soheil Tajeddini, Dr. Abdollah Homaifar, and Dr. Fatehi: NC A&T State University, Greensboro, NC 27401.

The topology of the Fly-Back converter at an instance seems to be elementary in complexity. The basic makeup of a Fly-Back converter is an inductor, capacitor, diode, output resistance, and a switching system. I will be discussing the power stage of the Fly-Back converter, which consists of the previous components excluding the switching system. When choosing the needed components input, and output voltages are needed to figure what types of components will adhere to the design specifications. Using these specifications, the needed equations can be used to calculate the component stress levels the items have to withstand. With input voltages ranging from 36 – 72 volts the output voltage should regulate at the needed 5 volts when the right switching system is used in the implementation.

ASHLEIGH BEAMER

**Independence High
School**

Estrogen Regulation of the Chemokine CCR1 and its Ligands in the Mouse Uterus. Ashleigh Beamer and Dr. Yvette M. Huet-Hudson. University of North Carolina at Charlotte, Charlotte, NC 28223.

The purpose of this investigation was to see if estrogen regulated the expression of CCR1 and its ligands in the mouse uterus. Estrogen-treated uterine tissue was harvested and RNA was isolated from the uterine tissues. Once the RNA was Dnase-treated the RNA was reverse transcribed into cDNA. The cDNA was then amplified using (polymerase chain reaction) (PCR) for identification of the presence of mRNA for CCR1, MIP-1 alpha, and RANTES. The results of the PCR amplification showed that CCR1 was constitutively expressed in both the zero hour and one-hour estrogen samples. The MIP-1 alpha RNA appeared to be slightly downregulated by estrogen at one hour and the RANTES RNA was upregulated by estrogen at one hour. This data implicates estrogen regulation of CCR1/Rantes interactions as mediators in the implantation process in the mouse uterus.

RON T. BROWN

UNC-Chapel Hill

Studying Database Problems in Small Businesses. Ron T. Brown, Dr. Stephanie W. Haas. University of North Carolina at Chapel Hill, Chapel Hill, NC 27599

There is a great need for database and technical support in small businesses.

This study investigates the database (DB) environment of university presses across the United States. A questionnaire survey was administered to database administrators (DBAs) of university press DBs, followed by semi-structured interviews. The survey and the semi-structured interviews were conducted to determine the tasks, system environment and problems that DBAs of university presses encounter.

The presses surveyed had multiple operating systems (OSs) and/or database management systems (DBMSs). The importance of mailing functions and exporting monthly financial reports arose in the interviews. The majority of the DBAs interviewed said that there was little documentation of the press DB and the press was either migrating or planning to migrate to a new DBMS. As time continues, the tasks of the DBA and the DB environment will continue to get more complex. Software designers of DBs need to take into account the needs of small businesses by dividing the increasing job responsibilities of the DBA between intelligent automated software and other stakeholders in the DB environment.

JAVIER CISNEROS

NC State Univeristy

INTRAUTERINE EXPOSURE TO 5-AZA-2' DEOXYCYTIDINE AFFECTS SEXUAL BEHAVIOR IN MALE MICE. F. J. Cisneros and S. Branch. North Carolina State University, Raleigh, NC 27695.

Methylation of Cytosine in DNA regulates, in part, genomic imprinting. It plays a critical role in fetal growth and behavioral development. We have reported that intra uterine exposure to 5-AZA-2'- deoxycytidine (5-AZA-CdR) affects body size and reproductive activity in male mice. We determined if altered reproductive capacity in exposed male mice was caused by abnormal testis and epididymal morphology or sperm production. Testes of these mice were collected, the left was used for histological analysis, while the right was used to determine the daily sperm production. No abnormalities were noted in these parameters. To elucidate if the phenomenon was a behavior alteration, CD-1 pregnant mice were administered 1.0 mg/kg of 5-AZA-CdR i.p. Pregnant mice were allowed to give birth, then number and sex of pups were recorded. We observed that the ratio of male to female offspring was altered. At 12 weeks of age, treated offspring were weighed and included in a sexual behavior study test. 5-AZA-2'-deoxycytidine treatment resulted in low mating capacity and sexual interest of male offspring when exposed to a receptive female. Furthermore, total testosterone levels were not affected by the treatment. Due to observed changes in male:female ratios, presence of Sry gene in 5-AZA-CdR F1 males was determine. Since mating behavior was adversely affected by intrauterine exposure (without concurrent affects on testis histology, sperm counts, testosterone levels and presence of Sry gene) we suggest that the observed reproductive alterations are behaviorally related.

JASMINE DAVENPORT

North Carolina A&T State University

The Interpretation of Quantum Tunneling using Matlab Computer Simulation. Jasmine Davenport, Howard Hughes Medical Institute- Summer Research Intern Program, Dr. Dean Lee, North Carolina State University, Raleigh, NC 27695.

A computer simulation is created, using Matlab, where a pulse signal is produced and travels through a barrier. The amount of time it takes for the pulse signal to enter and leave the barrier is measured. The procedure is repeated multiple times with different variations on the height, length, and potential energy of the barrier. The objective is to observe whether modifications of the barrier have a direct affect on the tunneling time of the pulse signal. The measurement of the change in time of travel aids in the calculation of the speed at which the pulse signal travels. The results from the simulation show that the tunneling rate for a particle following the non-relativistic Schrödinger equation is instantaneous. There is a relationship between the properties of the barrier and the amount of time to tunnel through the barrier, but these appear to be entwined with the detection threshold for the time measurement. The computer simulation technique will be helpful as further studies and experiments are currently being studied in detecting signals traveling faster than the speed of light.

JENNIFER DAVIS

**North Carolina A&T
State University**

Mineral Water Field Audit. Jennifer Davis and Michael Bauer. North Carolina A&T State University, Greensboro, NC 27410, Laboratory of Materials Analysis, The Coca-Cola Company, Atlanta, GA.

Acetaldehyde and n-nonylaldehyde are known to have an organoleptic affect on different types of beverages, especially water. By optimizing the water's packaging (bottle and closure) the high levels of these organic compounds should no longer exist or be lowered significantly. The objective of this research is to determine whether a packaging approach using new packaging technologies is able to significantly lower the amounts of acetaldehyde and n-nonylaldehyde present. A variety of water samples of the same brand, but of different sizes, and from different venues, were used. The water was analyzed for acetaldehyde by spiking the sample with an intermediate and then analyzing the sample on the gas chromatography flame ionization detector. The water was analyzed for its n-nonylaldehyde content by performing extractions, and then running the extracted mixture on a gas chromatograph/mass spectrometer. The levels of both compounds were examined closely, and if the levels were higher than the known standard, they were considered to be responsible for any change in the taste of the beverage. In the course of this experiment, it was noted that the levels of acetaldehyde were not lowered, but the n-nonylaldehyde were lowered significantly. It has been recommended that research in this area continue to focus on optimizing the container in closure optimization, since the latest research has shown that closure has been optimized.

FRANKI FAULKNER

North Carolina A&T State University

Prevention Program in African American Girls and Their Female Caregivers: Girls Rule! Franki Faulkner, Benita Weathers, Dr. Alice Ammerman. North Carolina A&T State University, Greensboro, NC, 27411, University of North Carolina at Chapel Hill, Health Promotion and Disease Prevention, Chapel Hill, NC.

Obesity among adolescent and preadolescent girls has become a national public health concern, with African American girls, ages 6 to 11, having the highest level of overweight (Troiano and Flegal, 1998). Girls Rule! a pilot study in obesity prevention, targets African American girls age 6 – 9 and their female caregivers. Home visiting, which has been used in health promotion for a variety of issues, was one component used to deliver the Girls Rule! intervention. Eight female caregivers who received all four home visits were surveyed via telephone to evaluate different aspects of the home visits and to what extent they effected changes in physical activity and nutrition behavior. Results showed an overall satisfaction with the home visits. Participants reported following through and still practicing most goals set during the home visits. More research is needed to assess feasibility of continuing to use home visits in a program like Girls Rule! on a larger scale.

JESSICA FISHER

**North Mecklenburg
High School**

S-adenosyl-L-methionine Decreases Collagen Expression and Inhibits Hepatic Stellate Cell Activation.
Jessica Fisher and Dr. Laura Schrum. University of North Carolina at Charlotte, Charlotte, NC 28223

Liver fibrosis is a wound healing process that occurs as a result of chronic liver injury. This study examined the effects of S-adenosyl-L-methionine (SAmE) on collagen expression and hepatic stellate cell (HSC) activation. We hypothesized that an antioxidant, SAmE, would decrease collagen expression and HSC activation. To test this hypothesis, HSCs were isolated from the liver of Sprague-Dawley retired breeder rats. Cells were then treated with either ethanol or acetaldehyde in the presence or absence of SAmE. Expression levels for α -smooth muscle actin (α SMA) and α 2(I) collagen were determined. Results showed that SAmE decreased α SMA mRNA and protein. Additionally, SAmE decreased collagen production in ethanol and non-ethanol treated samples. These results show that SAmE can inhibit HSC activation and decrease collagen production and that SAmE may be effective at different stages of liver fibrosis.

JUSTIN GLOVER

Shaw University

TRANSMITTED VERSUS REFLECTED RAMAN SIGNAL¹ Glover, J. E.² and Hans Hallen³, ²Department of Natural and Physical Sciences, Shaw University, Raleigh, NC, ³Department of Physics, North Carolina State University, Raleigh, NC

In previous near-field Raman experiments with crystals, which measure vibration energies with light, no enhanced Raman signal was observed from bonds (and the associated vibrations) in the plane of the surface of the crystal. However, the enhanced signal is expected to occur for all Raman modes due to the enhanced electric field near the probe. It is proposed that this is due to the light not being able to reach the collection lens due to the metal boundary conditions for propagation back around the probe. The metal only allows the electric field from the light to be perpendicular to the surface. The Raman signal from the bonds in the plane of the surface would have the electric field in the wrong direction, so is instead reflected from the probe back towards the sample. To test this model, the experiment is set up to collect Raman signal that is transmitted through the sample, so not to subject to the propagation constraints near the tip. The beam from an argon laser is directed through a tapered optical fiber, then reflected off the crystal sample. The collection lens is placed beyond the sample to collect the transmitted signal, and direct it into a spectrometer where a cooled CCD camera detects the Raman scattered light.

¹Work supported by NSF Research Experience for Undergraduates

SHYLISE GRIFFITHS

North Carolina A&T
State University

Analysis of the V4/V5 Region of the SIV Envelope Protein in Relation to Route of Infection. Shylise Griffiths, B. Rybarczyk, P. Johnson, and R. Swanstrom. North Carolina A&T State University, Greensboro, NC 27411, University of North Carolina at Chapel Hill, Chapel Hill, NC, Childrens Research Institute, Columbus, OH.

The simian immunodeficiency virus (SIV), which is closely related to the human immunodeficiency virus (HIV), infects non-human primates and serves as a useful animal model to study HIV infection. The envelope protein (*env*) on the surface of the virus is responsible for recognition and attachment to CD4+ host immune cells. The *env* protein is composed of constant regions and five variable regions (V1-V5). HIV infection has been difficult to control because HIV *env* mutates, leading to diversification and development of escape variants that evade the host immune system. In this study, the evolution of the V4/V5 region of *env* was analyzed in relation to route of challenge. Rhesus macaques were infected with the pathogenic SIVsmE660 isolate either intravenously (IV) or intrarectally (IR). Plasma samples were collected from macaques up to 41 weeks post-infection (p.i.). Viral RNA was isolated from plasma samples and RT-PCR was performed to amplify the V4/V5 region. Heteroduplex tracking assays (HTA) were conducted using a radioactively labeled SIVsmH-4 V4/V5-specific probe. The relative abundances of V4/V5 variants were quantitated using phosphorimaging. Results showed that at wk 2 p.i., V4/V5 variants were similar between IV and IR challenged animals suggesting that the macaques were equally permissive for establishment of each of the V4/V5 variants. Changes in the abundance of established V4/V5 variants occurred after wk 16 p.i. in both IV and IR challenged animals.

JACLYN GUESS

**Saint Augustine's
College**

The Antagonist MDL72222 Competitively Blocks Serotonin-Induced 5-HT₃ Receptor Response in NG108-15 Cells

Jaclyn D. Guess^{1,2}, Mark A. Melton^{1,2}, Patricia W. Lamb¹, and Jerrel Yakel¹

¹Laboratory of Signal Transduction, National Institute of Environmental Health Sciences, National Institute of Health, P.O. Box 12233, RTP, NC 27709;

²Department of Biology, St. Augustine's College, Raleigh, NC 27610

The 5-HT₃ receptor, a member of the superfamily of ligand-gated ion channels, is widely expressed in the nervous system and mediates fast synaptic transmission, primarily in response to the excitatory neurotransmitter serotonin. These receptors play an essential role in brain development, cognition, and behavior. Inhibition of 5-HT₃ receptors has been implicated in a variety of neurodegenerative diseases, including Alzheimer's and Parkinson's disease. The purpose of this project was to study the effect of MDL72222 (known antagonist) on serotonin induced 5-HT₃ receptor response in NG108-15 cells. It has been shown that this cell line, derived from neuroglial cells in the brain, expresses 5-HT₃ receptors. Current flow is an indicator of ion-gated channel activation. In that regard, we developed a model system to study current flow in response to 5-HT₃ activation employing the whole cell patch clamp technique. Results showed that serotonin induces an inward current on 5-HT₃ receptors expressed in NG108-15 cells, with some desensitization in response to repeated pulses. Serotonin induced activation is totally blocked by MDL72222 at concentrations of 10nM or above and partially blocked at concentrations of 5nM or less. These findings show that 5-HT₃ receptor activity is affected by antagonists such as MDL72222. Further, these findings suggest that chronic exposure to similar environmental inhibitors may interfere with normal 5-HT₃ receptor function that may lead to neurodegenerative diseases.

VICKI JOHNSON

UNC-Chapel Hill

The Synthesis of the Tungsten Carbene and Its Reactivity. Vicki Johnson, Neil Vogeley, and Dr. J.L. Templeton. University of North Carolina at Chapel Hill, Chapel Hill, NC 27599.

Carbenes are used as catalysts for polymerizations and organic transformations. These processes occur in the making of substances such as dicyclopentadiene, which is used to make plastic parts for cars, satellite dishes and snow mobile bodies. In this experiment, a series of experiments rooted from the tricarbonyl anion were performed to end with the tungsten carbene that could be reacted with other compounds. Tricarbonyl iodide was synthesized. Using the product, a phenyl methyl alkyne complex was produced. With the result, the iodine of the alkyne complex was replaced with a methyl group by using LiCuMe , making the complex. The product was reacted with triphenylcarbenium hexafluorophosphate (trityl⁺ cation) to produce the tungsten carbene. After the carbene was produced, it reacted with triphenyl phosphine and was recrystallized. After this reaction was complete, the tungsten carbene was reacted with tert-butyl acetoacetate. The next attempted reaction was the tungsten carbene with a tosyl nitrene source ($\text{PhI}=\text{NTs}$), but there was no reaction. The carbene was then reacted with trimethylamine N-oxide. Although there was a product of the reaction, but it is unknown whether it was the product that was trying to be produced. To determine such, the experiment would have to be completed again. Then the products were analyzed using the REACTIR instrument and the Bruker 300MHz NMR instrument. The creation of the tungsten carbene was successful. Through the experiments, the reactivity of the carbene was investigated and it was found that the tungsten carbene is electrophilic and is attracted to nucleophiles.

LEROY MAGWOOD

Benedict College

Chemistry of asphaltene solubility fractions as probed by UV-vis spectroscopy

Leroy Magwood

Benedict College

Junior

Dr. Peter K. Kilpatrick, Keith L. Gawrys*

Asphaltenes from two different crude oils (Arab Heavy and B6) were partially precipitated in mixtures of heptane and toluene to produce 20-30 different solubility fractions. The individual fractions were analyzed chemically by Fourier Transform Infrared Spectroscopy (FTIR) to determine relative amounts of carbonyl and other polar functional groups (C, H, N, S, O). Several dilute solutions of the asphaltene fractions dissolved in toluene were prepared and measured using UV-vis absorption spectroscopy. The molar extinction coefficient (ϵ) was calculated at various wavelengths by applying the Beer-Lambert law. Fractionation appeared to concentrate the most polar species into the least soluble sub-fraction as indicated by elemental analysis. UV-vis results indicated that the least soluble fractions had lower ϵ than the more soluble fractions, possibly due to a lower aromaticity (higher H/C ratio). The fractions with a lower ϵ constituted the least soluble 10% of the whole asphaltenes and were shown by small angle neutron scattering to form the largest aggregates in solution. The less soluble asphaltenes contribute the majority of species responsible for aggregation and likely cause many petroleum production problems such as pipeline deposition and water-in-oil emulsion stabilization.

* NC State University, Department of Chemical Engineering

LAKISHA PARTMAN

**North Carolina A&T
State University**

Effects of Socioecological Factors 2. LaKisha Partman, Marlon Walker, Cheryl Armstead. North Carolina A&T State University, Greensboro, NC 27411, University of South Carolina, Columbia, SC.

Previous research has examined the role of skin color and blood pressure in the laboratory setting. The present study was designed to examine the effects of skin tone and various socioecological settings on ambulatory blood pressure among African-Americans. Ambulatory measurements of systolic blood pressure, diastolic blood pressure, and heart rate were taken every half hour over a 24-hour period. Repeated analysis of covariance indicated that darker-skinned African Americans have significantly higher diastolic blood pressure while in the academic setting of a predominately white university. Other socioecological environments such as work, and home had no affect on blood pressure among darker-skinned African Americans. Implications for cardiovascular disease, are not enough. Also, it is necessary to look at skin tone variability among African Americans. In addition, we need to understand the dimensions of the academic stress for the different skin tones of African American students. Given our findings, early health psychology interventions are warranted for African American college students.

TYRA PENDERGRASS

Harding University High School

Utilizing fluorescent particles in multiple indicator dilution technique to measure the hepatic endothelial cell permeability. Tyra Pendergrass and Dr. Jian Zhang. University of North Carolina at Charlotte, Charlotte, NC 28223

The ultimate goal of this study is to determine whether hypothermal machine perfusion preservation increases the permeability of the liver's endothelial cells by using the multiple dilution technique (MDT). The immediate focus of this experiment was to test whether fluorescence labeled particles could be used to substitute the traditional radioactive isotope labeled particles in MDT. Sprague-Dawley male rats between 200-300 g were used. The liver was isolated and perfused via the portal vein with a perfusion system. Red blood cells (RBC, large size), albumin (medium size) and dextran (small size) were labeled with two colors of fluorescence. Two combinations (FITC-RBC + Texas Red-albumin and FITC-albumin + Texas Red-dextran) were separately injected into the liver through the portal vein. Samples from the effluent were taken every second for a total of three minutes after each injection. The quantity of the fluorescent particles was measured by the CytoFlour multiplate reader. The data was then plotted. The RBC appeared and was cleared first in the effluent. Albumin following RBC came out second, and dextran was cleared from the effluent last. The plotted curves for the three different sizes of substances were similar to those reported using radioactive particles. These results show that application of fluorescent particles can be used as a promising alternative to replace traditional radioactive particles for multiple indicator dilution technique.

ROY PETERS

Vance High School

Phototoxic Conditions of the Fluorescent Probe, Dichloro tris(1,10-phenanthroline) Ruthenium (II) Hydrate on Liver Cells after Intravenous Application. Roy Peters and Dr. Mark G. Clemens. University of North Carolina at Charlotte, Charlotte, NC 28223

Understanding liver function through oxygen mapping requires a fluorescent probe, which can be seen using microscopy techniques. The current assessment of this work is to determine if the dye Ru(phen)₃(2+) will have any phototoxic effects when used in viable liver cells to probe oxygen concentrations. This report demonstrates that Ru(phen)₃(2+) administered at a higher concentration greater than approximately .02mmole per kg bodyweight, has apparent neurotoxic effects resulting in respiratory failure and decreased heart rate. With high concentrations, respiratory failure was irreversible. However, at a lower concentration where neurotoxicity is not evident, the fluorescence intensity is not adequate to allow observation on the microscope. Phototoxicity was not a factor, when checking cell permeability. After injection of Propidium Iodide (which determines the cell damage by fluorescing activity under the appropriate microscope filter), almost no fluorescence was seen after the ruthenium injection, indicating no cell damage.

SHANTE' SCOTT

**Southeast Raleigh High
School**

Does Ascorbic Acid Reduce The Injury From Ozone In Wildflower Species?

Shante' T. Scott

Southeast Raleigh High School
MSEN Pre-College Program
Class of 2003, Raleigh NC

Dr. Kent O. Burkey, Associate Professor
North Carolina State University
Department of Crop Science
USDA Plant Sciences Research
Teacher Intern

Mrs. Beverly Vance, Science Teacher
Southeast Raleigh High School
Raleigh, North Carolina

Ambient Ozone is a gas that is created through natural and human made sources. When it enters plants it can cause devastating and reoccurring symptoms. Ascorbic acid has been found to slow down the effects of ozone. Plants store it in both the reduced and oxidized form. This experiment was designed to test the hypothesis that quantitative measurement of leaf ascorbic acid will show that the species with a higher level of ascorbic acid will not show signs of ozone injury. Ascorbic acid was extracted from the leaves of three wildflower species: Cutleaf coneflower (*Rubeckia laciniata*), Tall milkweed (*Asclepias exaltata*) and Crownbeard (*Verbesina cidentalis*). Assays were run using a spectrophotometer. Initial and final readings were taken for the change in absorbency for each sample. The total amount of ascorbic acid in each leaf was calculated using Beer's Law. Though some leaves did have more ascorbic acid than others, the research hypothesis that ascorbic acid prevents ozone injury cannot be supported because the data is incomplete and the experiment is ongoing.

RACHEL SILVER

Bennett College

EST SEQUENCING OF SORGHUM. Rachel A. Silver. Department of Plant Biology, University of Georgia, Athens, GA 30602 Dr. Lee Pratt

Sorghum is an important plant closely related to rice, sugarcane, and maize that exhibits drought resistance. An expressed sequence tag (EST) is a DNA sequence that comes from sequencing cDNA, a complement of mRNA. Since mRNA is translated into protein, sequencing sorghum ESTs will allow one to identify what proteins, and how many of each protein, sorghum makes. This is done by manipulating DNA. Sorghum cDNAs were inserted into plasmids with an ampicillin resistant gene. The cDNA was then amplified and isolated using methods of inoculation, bacterial lysis, aggregation of bacterial debris, supernatant transfer, DNA precipitation, and DNA quantification. Each cDNA is then sequenced from either end to yield ESTs. The average percent for good sorghum sequences was 82.2% (the lab aims for 70%), and the average read length of all the sequences was 561. From 768 sequences, 108 contigs or clusters were produced. Twenty of these contigs were introduced to BLAST, which compares the contigs to a database of known proteins. Some proteins found in sorghum were Ubiquitin, Heatshock, and Carbonic Anhydrase chloroplastic precursor. With this information and more research, steps towards genetic modification can be taken to improve sorghum and other water resistant plants.

KENDRA SIMPSON

NC State University

Crystallization Kinetics of a Trimethyl Ammonium Template [HTMA] of Copper Zinc Chloride [CuZn₅Cl₁₂]: CZX-1, Kendra Simpson, Steve Goettler, Dr. James D. Martin, North Carolina State University, Raleigh, NC 27695

From previous experiments, the glass CZX-1 was found to be a composition of sodalite cages. Science recognizes the similarity between the structures of the glassy state and its crystalline form. We knew that the CZX-1 undergoes a glass transition at $\sim 60^{\circ}\text{C}$ as well as a recrystallization mechanism; this made us wonder exactly what was the mechanism for that recrystallization/devitrification. X-Ray Diffraction was used to examine this mechanism, resulting in an activation energy, EA, of our product. From various mathematical processes, we were able to calculate from our collected data that the EA of CZX-1 is $\sim 110\text{kJ}$.

JONATHAN SMITH

North Carolina A&T State University

A Synoptic Climatology of Major Winter Weather Events in the Northeast and Mid-Atlantic by Arctic Oscillation Phase. Jonathan Wynn Smith, Dr. Wayne Higgins, and Mr. David Caldwell. Climate Prediction Center/National Centers for Environmental Prediction/National Weather Service/National Oceanic and Atmospheric Administration, Camp Springs, MD, 20233.

The Arctic Oscillation (AO) is leading pattern of natural climate variability in the Northern Hemisphere's extratropics. It has a major influence on the frequency of extreme winter weather events over the conterminous United States. Also the AO has poor predictability. Therefore it would be good to know the characteristics of winter storms by AO phase so forecasters can have some guidance when their computer models are disagree. To find these characteristics a synoptic climatology of major winter weather events by AO phase was developed for the Northeast and Mid-Atlantic regions of the conterminous United States. Ranked time series of daily precipitation, surface-air temperature, snowfall, and sea-level pressure data for the period January-March 1950-1999 are used to define the major weather events. Composites of the surface weather and tropospheric circulation patterns that accompany selected types of East Coast winter storms (intense lows and heavy snow events) are contrasted by positive and negative phases of the AO. The study highlights differences in the evolution, intensity, movement, and amount of precipitation that occur with these extreme winter weather events as a function of AO phase. The significant discoveries of this study were related to the track of lows by intense low and heavy snow events or by AO phase.

BASSIROU SOCK

**North Carolina A&T
State University**

Analysis and Implementation of a Fly-Back DC/DC converter operating in Continuous conduction mode.
Bassirou Sock, Jamaica Barnette, Soheil Tajeddini, Dr. Abdollah Homaifar, and Dr. Fatehi: NCA&T State University, Greensboro, NC 27401.

This Presentation describes the implementation of a Fly-Back DC/DC converter operating in Continuous Conduction mode with control system regulating an output to 5V from an input varying between 36 and 72V. The Control is build using a PWM switch with a PID controller as a compensator. There are three stages in the design: Power stage, Inductor design, and Control design. The part that will be discussed in this presentation will specifically be related to the Control Design. The project is dealing with Pspice simulation test and experimental test. The control is also regulating at 10% after input range specifications.

RENARD SPRATLING

North Carolina A&T
State University

Multi-user Distributed Workspace for Human-Computer Integration and Joint Motion Planning. Renard D. Spratling, and Dr. Albert Esterline. North Carolina A&T State University, Greensboro, NC 27411

In modern computer science, the communication between multiple users and transfer of data is highly valued. The aim of our research is to establish effective means for allowing users to work together towards a common goal while at separate machines as well as identify methods of using computers as the arbiters of tasks that require intensive cooperation. The goal consists of the users cooperatively planning and navigating mobile agents from a starting to a finishing point on a grid while avoiding collisions with static obstacles and other agents. We have also introduced into the environment intelligent agents, which plan and traverse their paths with no human assistance. We want to find the solution that gets all the agents to their destinations in the shortest time possible. To determine these optimal paths, we use two methods: a modification of Lee's algorithm and a heuristic search known as the A* algorithm. In addition, we have successfully implemented an automated version, which can include human controlled and/or intelligent agents. A communication medium has been established that allows the users to relay plans for accomplishing the goal by using message passing functionality and whiteboards. We are implementing such communication by utilizing graphical user interface functionality and client/server technologies available with the Java programming language for the establishment and maintenance of communication between all involved parties over a network. We are currently incorporating the human controlled aspect of the project with the automated process all while ensuring the proper distribution of data to all users.

SOHEIL TAJEDDINI

**North Carolina A&T
State University**

Analysis and Implementation of a Fly-Back DC/DC converter operating in Continuous conduction mode., Jamaica Barnette, Soheil Tajeddini, Bassirou Sock , Drs. Abdollah Homaifar and Freshteh Fatehi: NC A&T State University, Greensboro, NC 27401.

This Presentation describes the design and implementation of a the inductor, the constrains and design verification for Fly-back converter operating in Continuous Conduction mode with control system regulating an output of 5V from an input varying between 36 to 72V. The inductor is build using EFD core shape with turn ratio of 11:1, and using 3F3 material. The project is dealing with pspice and Pemag simulation, layout and experimental test.

DANIEL WILLIAMS

Emory University

Regulation of Gene Expression in *Neisseria gonorrhoeae*. Daniel Williams and William M. Shafer. Department of Microbiology and Immunology, Emory University, Atlanta, GA

Neisseria gonorrhoeae is a gram-negative, strict human pathogen that causes the sexually transmitted disease gonorrhea. Although the incidence of disease has decrease substantially, the percentage strains previously resistant to antibiotics (penicillin, tetracycline, and ciprofloxacin) have increased. Gonococcal infections were successfully treated with inexpensive antibiotics (e.g. penicillin and tetracycline) but due to the emergence of stains with decreased susceptibility, more expensive treatment regimens have been necessary. Although gonococci utilize various resistance mechanisms, we are specifically interested in the ability of the *mtr* efflux pump to remove antibiotics. The multiple transferable resistance locus (*mtr*) encodes three cell envelope proteins (MtrC-MtrD and MtrE) that form an energy-dependent efflux pump. The *mtrCDE* operon is negatively and positively regulated at the transcriptional level by transcriptional regulators MtrR and MtrA, respectively. MtrR and MtrA could regulate other genes, which encode proteins needed for virulence. Preliminary results from 2-D IEF/SDS-PAGE of total protein profiles of isogenic MtrR⁻ and MtrR⁺ strains have shown 12 proteins present at higher levels in MtrR⁺ and only 3 proteins at higher levels in MtrR⁻ strains. 2-D analysis of Mtr A induction showed an increased production of at least three proteins to higher levels. Isogenic strains of Mtr R and Mtr A differing in the production of these transcriptional regulators will be evaluated in order to determine how the loss these regulators control global gene expression. We propose to determine the temporal expression of genes encoding transcriptional regulatory proteins and to use mutant strains deficient in these proteins to ascertain genes controlled by them. Gene-chip technology will be used to identify and characterize genes regulated by Mtr R and Mtr A in gonococci grown under different stress conditions.

ADRIENNE YANCEY

Southeast Raleigh High School

Does Ascorbic Acid Aid In Providing Protection Against Ozone In The Following Wildflower Species?

Adrienne Yancey

Southeast Raleigh High School

MSEN Pre-College Program

Class of 2003, Raleigh NC

Preceptor

Dr. Kent O. Burkey, Associate Professor

North Carolina State University

Department of Crop Science

USDA Plant Sciences Research

Teacher Intern

Mrs. Beverly Vance, Science Teacher

Southeast Raleigh High School

Raleigh, North Carolina

Wildflower species cutleaf coneflower, tall milkweed, and crownbread were compared for vitamin C levels. Vitamin C, chemically known as ascorbic acid, is found in various types of plant species. Studies have been conducted to determine the possible purpose for plants to possess this element, ascorbic acid. Results showed that ascorbic acid helps plants fight the signs of ambient ozone injury. The more ascorbic acid found in plants, the better the plant can fight off ambient ozone. Ambient ozone is a harmful gas that causes foliar injury and reduces growth and yield in many crops that are exposed to it. This experiment was designed to test a procedure that finds the amount of reduced and oxidized ascorbic acid in plants; specifically wildflower species. The procedure formulated seems to work in wildflower species tall milkweed and crownbread. Ascorbic acid was successfully extracted from both plants. However in the third species the data collected from the plant concludes that modifications will be needed. Furthermore, this research project is on-going and more research is needed to make an accurate synopsis.

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