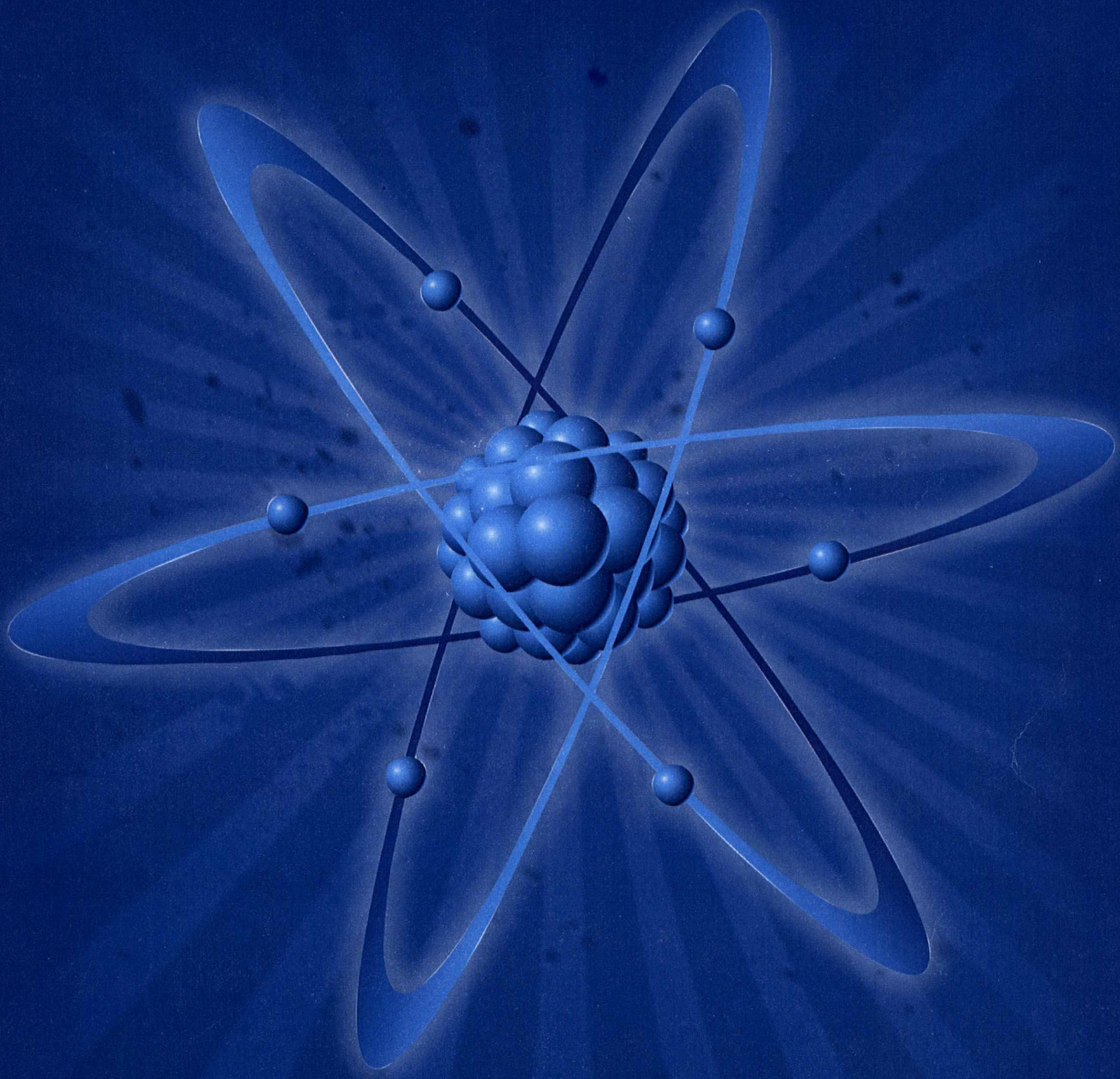

Fourth Annual

Virginia – North Carolina Alliance Symposium

April 13 - 14, 2011 – University of Virginia

VIRGINIA/NORTH CAROLINA
Alliance for Minority Participation

University of Virginia Central Grounds

Short History of U.VA.

Thomas Jefferson founded the University of Virginia in 1819. He wished the publicly-supported school to have a national character and stature. Jefferson envisioned a new kind of university, one dedicated to educating leaders in practical affairs and public service rather than for professions in the classroom and pulpit exclusively. It was the first nonsectarian university in the United States and the first to use the elective course system.

Jefferson considered the founding of the University to be one of his greatest achievements. He planned the curriculum, recruited the first faculty, and designed the Academical Village, a terraced green space surrounded by residential and academic buildings, gardens, and the majestic center-point—the Rotunda. The most recognizable symbol of the University, the Rotunda stands at the north end of the Lawn and is half the height and width of the Pantheon in Rome, which was the primary inspiration for the building. The Lawn and the Rotunda have served as models for similar designs of "centralized green areas" at universities across the United States.

Directions from Cavalier Inn to Rotunda

Head south on Emmet St N toward Ivy Rd - 190 ft
Take the 1st left onto US-250 BUS E/Ivy Rd/University Ave Continue to follow US-250 BUS E/University Ave 0.2 mi
Turn right at McCormick Rd Destination will be on the left .

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Inauguration of

Teresa A. Sullivan

as the University's Eighth President

An inauguration is an important inflection point in the history of a university. It is a time for the community to look inward and to consider its future. It is not about an individual, but a celebration of an institution, its values and mission. A good way to do that is to focus inauguration events around our mission of teaching, research, public service, and health care.

The week is designed to engage students, staff, faculty and alumni in different ways in the life of the University, whether it be through the interfaith service, the research/scholarship poster competition, the academic symposium, the day of service, or the inaugural walk. I wanted to make sure there would be something that reflected all aspects of our mission -- as well as activities in which every member of our community could see something for themselves.

My hope is that the range of activities will encourage broad participation in the inauguration. I know everyone here works hard on behalf of the University. April 15 should be a day on which we celebrate together our daily achievements -- and our future aspirations.

- Teresa A. Sullivan

Biography

Teresa A. Sullivan was elected eighth President of the University of Virginia, effective Aug. 1, 2010.

Before coming to U.Va., President Sullivan was the Provost and Executive Vice President for Academic Affairs at the University of Michigan. She was also Professor of Sociology in the College of Literature, Science, and the Arts.

Prior to coming to the University of Michigan, Ms. Sullivan was Executive Vice Chancellor for Academic Affairs for the University of Texas System, a position she held from 2002 until May 2006. In that role, she was the chief academic officer for the nine academic campuses within the University of Texas System.

Ms. Sullivan's research focuses on labor force demography, with particular emphasis on economic marginality and consumer debt. The author or co-author of six books and more than 50 scholarly articles, her most recent work explores the question of who files for bankruptcy and why. Ms. Sullivan has served as chair of the U.S. Census Advisory Committee. She is past secretary of the American Sociological Association and a fellow of the American Association for the Advancement of Science. A graduate of James Madison College at Michigan State University, Ms. Sullivan received her doctoral degree in sociology from the University of Chicago.

For a full bio please visit the following website: http://www.virginia.edu/president/biography.html

UNIVERSITY of VIRGINIA

OFFICE OF THE PRESIDENT

April 13, 2011

Dear Friends:

I write to welcome you to Charlottesville and to the University of Virginia, and to thank you for participating in the 4th annual VA-NC Alliance Symposium.

The eight partner schools in the VA-NC Alliance have worked hard to increase the number of underrepresented minority students graduating with degrees in science, technology, engineering and mathematics. This is important work, and the stakes are high. We are falling behind other nations in the number of men and women earning college degrees, especially those who receive training in the STEM fields. The VA-NC Alliance is creating opportunities by helping students earn degrees in the STEM fields while building strength for the nation.

During this year's symposium, undergraduate students will present their research and learn about the graduate school process, including opportunities at Alliance colleges and universities. I encourage students to take advantage of undergraduate research opportunities and to consider options for extending their learning beyond the undergraduate level.

The VA-NC Alliance demonstrates the value of collaborating across institutional lines toward the advancement of knowledge and learning. I am very grateful for your commitment to the Alliance, and I hope that your symposium this year is both productive and enjoyable.

Very truly yours,

Teresa A. Sullivan

Teresa A. Sullivan
President

TAS:jdb

April 13, 2011

Greetings Symposium Participants:

On behalf of the Virginia-North Carolina Alliance, I welcome you to the Grounds of the University of Virginia (U.Va.). As the lead institution of the Alliance, the University is thrilled to host the fourth annual symposium. As you may notice, it is a busy time on "Grounds" with the inauguration of Teresa Sullivan, U.Va.'s eighth president and the first woman to lead the University. Inauguration events including panel discussions, a poster competition displayed in the Rotunda, and tours are occurring at the same time as the Alliance symposium. We hope you will have the opportunity to take advantage of some of these optional activities.

U.Va.'s commitment to the Alliance continues to grow. Among the University's priorities are diversity and science & technology. The primary goal of the VA-NC Alliance is to increase the quality and quantity of students receiving science, technology, engineering, and mathematics (STEM) degrees. U.Va. is a strong contributor in these areas. During the symposium Alliance students will describe how they are seeking solutions to complex global issues, collaborating with peers, and grappling with challenging problems.

The symposium offers an opportunity for each of us to engage with peers from our partner schools. I especially encourage students to have conversations and get to know the research interests of others who could become future colleagues. I appreciate the efforts of advisors, faculty, panelists, judges, and administrators, in addition to all of the hard-working Alliance students. This symposium would not be successful without your participation. It is my hope that each of you will enjoy the symposium and come away with new knowledge and acquaintances. Welcome to the University of Virginia.

Best wishes,

Marcus L. Martin MD

Marcus L. Martin, MD
Vice President and Chief Officer for Diversity and Equity
Principal Investigator, Virginia-North Carolina Alliance

Schedule

Wednesday, April 13

5-7 p.m.	Registration
7-9 p.m.	Welcome and Introductions; Dinner and Panel Discussion
9-10 p.m.	Interactive Video on Research Integrity or Gathering with Alliance Summer Researchers *All evening activities in the Jefferson-Monroe Room*

Thursday, April 14

8-9 a.m.	Registration, *Jefferson-Monroe Room*
9-9:15 a.m.	Welcome by Dr. Marcus Martin, Vice President and Chief Officer for Diversity and Equity, *Jefferson-Monroe Room*
9:15-10:30 a.m. Session One	Oral Presentations, *Meeting Rooms A and C* Poster Presentations, *Meeting Room B* Graduate School Information, *Meeting Room B*
10:30-10:45 a.m.	Break, *lounge outside Meeting Rooms A, B, and C*
10:45-noon Session Two	Oral Presentations, *Meeting Rooms A and C* Graduate School Information, *Meeting Room B*
12-1:30 p.m.	Awards Luncheon, *Jefferson-Monroe Room*
1:30 p.m. Optional Activities *Meet in Jefferson-Monroe Room*	• Tour of Grounds, ends 3 p.m. at Rotunda • Inauguration Poster Exhibition, *Dome Room,* Rotunda, ends 2:30 p.m. • Inaugural Academic Symposium Breakout Session "Situated Learning: Collaborative and Problem-Based Approaches" *South Meeting Room,* Newcomb Hall, ends 3:15 p.m.

Oral Presentations, Thursday, April 14

Time	Location	Presenter	Research Area	Institution	Research Title
9:15 a.m.	Room A	Cruz, Mariana	Civil Engineering; Structural Material Mechanics	George Mason University	*Numerical Evaluation of Mode-II Delamination in Layered Fiber Reinforced Composites*
	Room C	Awkard, Chantel	Biochemistry & Molecular Genetics	University of Virginia	*Chemogenomics of RaI Inhibitors*
9:30 a.m.	Room A	Dourassi, Bassam	Systems Engineering	George Mason University	*Communication Interface for a Prostate Cancer Simulator*
	Room C	Boykin, Ebonitta	Public Health	Bennett College for Women	*Evaluation of Preconception Care for Postpartum Care Benefits*
9:45 a.m.	Room A	Elsayed, Bilal	System Diagnostics	George Mason University	*Model-Based Methods for Fault Detection and Isolation*
	Room C	Clark, Alicia	Allergy	University of Virginia	*Disturbance of Dog Allergens to Report if Galactose-Alpha-1,3-Galactose is Airborne*
10:00 a.m.	Room C	Moore, Alycia Chanel	Cell Biology	University of Virginia	*Characterizing the Nature of the Xst199 Mutation and the Normal Function of the TANGO1 Protein in Trophoblast Cells*
	Room A	Heart, De Anthony	Aerospace Sciences; Space Exploration	Virginia Polytechnic Institute & State University	*Near Earth Object Flexible Architecture*
10:45 a.m.	Room A	Espina, Marissa	Physical Science Education	University of Virginia	*Inquiry Based Learning with a Light Meter*
	Room C	Shealey, Glasser	Biology	Elizabeth City State University	*Model for Studying Epigenetic Memory of Hypermethylator Breast Cancer Cell Lines*
11:00 a.m.	Room A	Foster, Avis	Mathematics	George Mason University	*Extensions of the Cable Equation Incorporating Spatial Dependent Variations in Nerve Cell Diameter*
	Room C	Smith, Keyona	Biology	Bennett College for Women	*The Effectiveness of Upper Extremity Exercise Device on Individuals with Disabilities*
11:15 a.m.	Room A	Jones, Jessica	Chemistry, Astronomy	Bennett College for Women	*Can Chemical Maps Indicate Interstellar Methyl Formate?*
	Room C	Taylor, Tarreyca	Biology	Elizabeth City State University	*The Biodiversity and Community Analysis of Nematodes in Lake Phelps, North Carolina*
11:30 a.m.	Room C	Molina, Alan	Biomedical Engineering	University of Virginia	*Fabrication of Nanofibrous Blend Polymer Scaffold for Wound Healing*

Poster Presentations, Thursday, April 14

Time	Location	Presenter	Research Area	Institution	Research Title
9:15-10:30 a.m.	Room B	Barham, Ashley	Chemistry, Astronomy	Bennett College for Women	*Can Chemical Maps Indicate Interstellar Methyl Formate?*
		Boyd, Sada	Fisheries Science	Bennett College for Women	*Individual Burrowing Behavior of Pacific Sand Lance (Ammodytes hexapterus): A Laboratory Experiment*
		Brown, Lanisha	Neuroscience	Bennett College for Women	*Detecting the Breakpoints of Williams Syndrome using High Resolution Microarrays and Quantitative-PCR*
		Cano-Mejia, Juliana	Tissue Engineering	University of Virginia	*Platelet-rich Plasma Isolation for Targeted Bone Tissue Engineering*
		Coates	Marcus	George Mason University	*Moodle Integrated Synchronous Teaching and Conferencing (MIST/C)*
		Griffin, Merischia	Biology	Johnson C. Smith University	*The Effect of Ouabain on Sodium Potassium ATPase a1 in the Heart*
		Harold, Virquan	Mining Ventilation	Virginia Polytechnic Institute & State University	*Design and Development of SPME Holder Device for Underground Mine Rapid Air Sampling and Air Quality Analysis*
		Jeffrey, Sarah	Immunology	University of Virginia	*Granuloma Imaging: Microbubbles & Luciferase*
		Judd, Rika	Microbiology	Virginia Polytechnic Institute & State University	*Variation in Observed Salamander Skin Bacterial Communities with Multiple Swabbing*
		Lahlou, Tarek	Electrical Engineering	George Mason University	*RHEED Image Analysis on Epitaxial Niobium Thin Films*
		Latore, Michaila	Biochemistry, Molecular Modeling	Virginia Polytechnic Institute & State University	*Inhibition of E2 Viral Protein to DC-SIGN of Dendritic Cell Can Lead to Advancement in Drug Therapuetics.*
		Manley, Matthew	Computer Networking	University of Virginia	*Software for the Identification of Organization Names and Countries Corresponding to IP Addresses*
		Mays, Jasmine Speas, Anthony Seabrooks-Matthews, Arianna	Chemistry	Johnson C. Smith University Johnson C. Smith University Virginia Polytechnic Institute & State University	*Identification of Molecules through Experimental and Computatonal Spectroscopy*
		Moore, Ashley	Mathematics	Johnson C. Smith University	*Chord Recognition through Wavelet Analysis*
		Pearson, Shoteria	Public Health	Bennett College for Women	*Does the Sharing of Unclean Syringes Increase the Risk of Contracting HIV and HCV?*
		Robinson, Laijia	Chemistry	Elizabeth City State University	*The Effects of Traditional Zimbabwe Medicinal Plants on Caspase-3 and Beta-Amyloid Cytotoxicity*
		Wright, Jamie	Biomechanics	University of Virginia	*Utilizing Micro-Computed Tomography (μ-CT) Scan Data to Create Finite Element Models of Lower Limb Bones*

Registrants

Bennett College for Woman

Barham, Ashley
Boyd, Sada
Boykin, Ebonitta
Brown, Lanisha
Coburn, Tonisha
Delva, Jeannette
Holland, Charmel
Jones, Jessica
Kellyman, Wanda
Kenley, Sharneice
Mills, Siebidi
Moreira, Cristina
Morris, Sydnye
Pearson, Shoteria
Pearson-Starling, Charnee'
Smith, Keyona
Wilson, Niedra
Wright, Tyler

Elizabeth City State University

Abebe, Euyalem
Gooden, Orestes
Robinson, Laijia
Shealey, Glasser
Taylor, Tarreyca
Wiggins, Tyisha

George Mason University

Adounvo, Christian
Berry, Alok
Coates, Marcus
Cruz, Mariana
Dourassi, Bassam
Elsayed, Bilal
Foster, Avis
Lahlou, Tarek
White, Bernard

Johnson C. Smith University

Butler, Justin
Chunn, Aryna
Dollard, Brittany
Griffin, Merischia
Gupta, Sunil
Jackson, Michelle
Johnson, Keneasha
Kirkpatrick, Jarrica
Marshall, Mattie
Matthews, Kiera
Mays, Jasmine
McMullens, LaKeisha
Moore, Ashley
Speas, Anthony
Taylor, Jalisa

Saint Augustine's College

Barham, Morgan
Coffer, Alexia
Dearring, Jaclynn
Gaine, Brooke
Harvey, Dorian
Jones, Kiara
Joyner, Allison
Payne, Gloria
Ramdon, Sanjay
Spence, Sheila
Stuart, Cai
Thomas, Kenya
Walker, Kayla
Winters, Monica

Registrants

University of Virginia

Awkard, Chantel
Cano-Mejia, Juliana
Cauley, Shirley
Clark, Alicia
Drake, Jasmine
Espina, Marissa
Jeffrey, Sarah
Manley, Matthew
Martin, Marcus
Molina, Alan
Moore, Alycia
Morgan, Kristin
Williams, Wraegen
Wright, Jamie

Virginia Commonwealth University

Aduba, Don
Herrera, Alfred
Hobson, Rosalyn
Mitchell, Ariel
Ratchford, Ellissa
Rolle, Trenicka

Virginia Polytechnic Institute & State University

Clay, Letitia
Harold, Virquan
Heart, DeAnthony
Judd, Rika
Latore, Michaila
Seabrooks-Matthews, Arianna
Thompson, Jody
Williams, Eric

"Undergraduate research is an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline."

The Council on Undergraduate Research

Presenters

Awkard, Chantel (University of Virginia)	*Chemogenomics of Ral Inhibitors*
Barham, Ashley (Bennett College for Women)	*Can Chemical Maps Indicate Interstellar Methyl Formate?*
Boyd, Sada (Bennett College for Women)	*Individual Burrowing Behavior of Pacific SandLance (Ammodytes hexapterus): A Laboratory Experiment*
Boykin, Ebonitta (Bennett College for Women)	*Evaluation of Preconception Care for Postpartum Care Benefits*
Brown, Lanisha (Bennett College for Women)	*Detecting the Breakpoints of Williams Syndrome using High Resolution Microarrays and Quantitative-PCR*
Cano-Mejia, Juliana (University of Virginia)	*Platelet-rich Plasma Isolation for Targeted Bone Tissue Engineering*
Clark, Alicia (University of Virginia)	*Disturbance of Dog Allergens to Report If Galactose-Alpha-1,3-Galactose is Airborne*
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Heart, DeAnthony (Virginia Polytechnic Institute and State University)	*Near Earth Object Flexible Architecture*
Jeffrey, Sarah (University of Virginia)	*Granuloma Imaging: Microbubbles & Luciferase*

Presenters

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Manley, Matthew (University of Virginia)	*Software for the Identification of Organization Names and Countries Corresponding to IP Addresses*
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Smith, Keyona (Bennett College for Women)	*The Effectiveness of Upper Extremity Exercise Device on Individuals with Disabilities*
Speas, Anthony (Johnson C. Smith University)	*Identification of Molecules through Experimental and Computational Spectroscopy*
Taylor, Tarreyca (Elizabeth City State University)	*The Biodiversity and Community Analysis of Nematodes in Lake Phelps, North Carolina*
Wright, Jamie (University of Virginia)	*Utilizing Micro-Computed Tomography (μ-CT) Scan Data to Create Finite Element Models of Lower Limb Bones*

Judges

Paul Allaire earned his Ph.D.in Mechanical Engineering from Northwestern University. As the Wade Professor of Engineering and Biomedical Engineering, his research interests span the areas of biomechanics; analysis of human movements; rotating machinery, bearings, rotor dynamics, seals, controls and fluid flows; magnetic bearing supported artificial human heart pump implantation; high speed energy storage flywheels; and finite element analysis.

Andres Clarens received his Ph.D. in Environmental Engineering from the University of Michigan. Upon completing his PhD, Andres joined the faculty at the University of Virginia in the Civil and Environmental Engineering Department. His current research and teaching interests focus on design for environment, industrial ecology, carbon dioxide utilization and sequestration and life cycle assessment.

James Cohoon received his Ph.D. in Computer Science from the University of Minnesota. In 1983, he joined the faculty at the University of Virginia in the Computer Science Department. Cohoon investigates application areas such as VLSI design automation, transport scheduling and routing, and Computer Science education. His interdisciplinary approach applies and extends nontraditional techniques such as computational geometry, probabilistic search, genetics, and parallel computing. In collaboration with his students Jim has produced state-of-the-art tools that are practical as well as theoretically interesting.

Elizabeth Daubert received her Ph.D. in Neuroscience from the University of Virginia where her thesis investigated the Aberrant serotonergic morphology in the central nervous system of Drosophila. Her current work and interests as a Research Associate include morphological aspects of circuitry including plasticity and effects on overall behavior of organisms.

Joel Hockensmith received his Ph.D.in Biochemistry from the University of Rochester Medical Center prior to joining University of Virginia School of Medicine as an Assistant Professor. He serves as the Assistant Dean for Graduate Research and Training and an Associate Professor of Biochemistry and Molecular Genetics at the University of Virginia School of Medicine. His current research focuses on the Biochemistry of DNA Metabolic Processes and the Molecular Interactions of Proteins. Future studies hope to expand and refine our understanding of DNA metabolic events in both the cancer cells and protozoans, with the goal of understanding mechanisms that could lead to the death of these cell types. Experimental protocols using a variety of DNA-dependent ATPase inhibitor species, with the goal of developing inhibitors specific for select eukaryotic cell types will also be evaluated.

William Johnson is the Professor and Chair of the Materials Science and Engineering Department at the University of Virginia. He earned his Ph.D. from the Michigan Technological University prior to working as a postdoctoral researcher, visiting scientist and professor throughout the U.S., France and Berlin. His current research focuses on theory and simulation in the area of diffusional phase transformations. Of particular interest is the influence of compositional and epitaxial strains on the thermodynamic description of crystals, the evolution of microstructure in thin films and bulk alloys, and the effect of stress on the kinetics of phase transformations.

Brooks Pate received his Ph.D. from Princeton University. As a faculty member within the Department of Chemistry at the University of Virginia, he studies the dynamics of molecules with significant amounts of vibrational energy. A major emphasis of this work aims to understand the spectroscopy of molecules as the intramolecular vibrational energy redistribution (IVR) process, and possibly reaction, occurs. In particular, he is interested in how coherent excitation of highly excited molecules can be used to influence reaction products. Recently, his lab has developed a new type of molecular spectroscopy called dynamic rotational spectroscopy to study isomerization reactions of isolated molecules.

Nathan Swami received his Ph.D. in Materials Science at the University of Southern California in Los Angeles. After working in the industrial setting for a number of years, Nathan joined the Electrical & Computer Engineering Department at the University of Virginia as a faculty member. Within his current role, he teaches courses in semiconductor devices, directs the Electrical Engineering Graduate Program, and conducts research in the area of molecular and bioelectric devices.

Abstracts

Awkard, Chantel (University of Virginia)

Chemogenomics of Ral Inhibitors

Research Area: Biochemistry and Molecular Genetics
Research Advisor: Dr. Daniel Burke

Bladder cancer is a relatively common and costly malignancy. The role of a small class of small G-proteins known as the Ras-like or Ral GTPases have been targeted due to recent advances in the understanding of the molecular pathogenesis of metastatic bladder cancer. These signaling proteins, regulated by the Ras pathway, have shown to be necessary for key cellular phenotypes associated with transformation or cancer progression in diverse cancer systems. This experiment investigated the impact of chemical inhibitors of the ral GTPase by using yeast chemogenomics to determine the mode of action of the ral inhibitor to reveal any effects other than on ral. Cultures of homozygous diploid cells were inoculated using pooled deletion mutants and grown for 20 generations using chemical ral inhibitors developed by Dr. Dan Theodorescu, a Professor of Urology at the University of Virginia. Two cultures were grown in two separate drug environments, and one in a controlled drug free environment. The pooled cultures of tag yeast deletion mutants underwent a two step process following pooled growth: isolation of genomic DNA and PCR amplification of the barcodes. Due to time limitations on the experiment, no significant data about the effects of the ral inhibitors can be obtained until array hybridization and data analysis is completed. Results may indicate that no mutants are affected, hinting that the drug could be a specific ral target. The second possible outcome is that many mutants are affected, proving the sensitivity of the strains to the drug. In this case, the relationship between the off-target effects on the mutants will be analyzed to determine the other specific targets of the drug.

Barham, Ashley (Bennett College for Women)
Jones, Jessica (Bennett College for Women)

Can Chemical Maps Indicate Interstellar Methyl Formate?

Research Area: Chemistry, Astronomy
Research Advisor: Dr. Anthony Remijan

Methyl formate (HCOOCH3) is a well known molecule in the interstellar medium; however its formation is not clearly understood (Horn et al.2004). It is presumed that methyl formate is formed in various processes such as, grain chemistry (Garrod and Herbst,2006) and other gas-phase mechanisms (Horn et al. 2004). We propose that methyl formate is formed through a methyl transfer reaction leading to two different geometries of methyl formate, cis- and trans-. There are two consequences of this hypothesis; in the interstellar medium in regions where we find methyl formate, formic acid should be absent. The second consequence is that we should be able to find the cis- and trans- geometries of methyl formate in space. Liu et al. (2002) mapped the distribution of methyl formate and formic acid and showed that there is a clear difference in the locations of the peaks. These observations support the first consequence of our hypothesis. The cis- and trans- geometries have also been detected toward the SgrB2N star forming region. Therefore, the next step was to detect these two geometries of methyl formate (cis- and trans-) in the Orion KL region and we attempted this detection using the GBT.

Abstracts

Boyd, Sada (Bennett College for Women)

Individual Burrowing Behavior of Pacific Sand Lance (Ammodytes hexapterus): A Laboratory Experiment

Research Area: Fisheries Science
Research Advisor: Dr.Tina Wyllie- Echeverria

A 24 hr. behavior study on the Pacific sand lance, Ammodytes hexapterus was conducted to determine if all sand lance burrow and is there independent variation among burrowing behavior. Sand lance were put into separate tanks with the same environmental conditions to ensure all sand lance were experiencing the same environment. A. hexapterus behavior was observed and documented hourly during the 24hr. time frame. Sand lance behavior was characterized into four behaviors (1) burrowing, (2) swimming, (3) emerging and (4) and resting. Results of the study showed that all sand lance burrowed. However, the behavior of sand lance varied among individuals.

Boykin, Ebonitta (Bennett College for Women)

Evaluation of Preconception Care for Postpartum Care Benefits

Research Area: Public Health
Research Advisor: Dr. Brigit Carter

Preconception care is defined as a set of interventions that aim to identify and modify biomedical, behavioral, and social risks to a woman's health or pregnancy outcome through prevention and management, emphasizing those factors which must be acted upon before conception or early in pregnancy to have maximal impact. As of today there is an estimated 6.7 deaths per live 1,000 births of infants among the United States. There are several initiatives already in place in Durham to help pregnant women and new moms, but few address post partum/interconception health. The ones that do exist often have a cost associated with them. The two that this project will look into include the Baby Love program and Durham Connects. Welcome Baby also has some supportive classes for pregnant and new parents in the Durham County areas. However, there is a strong need for postpartum care/preconception care; the things of which these vary programs listed have lacked. The purpose of this research is to create or design methods and interventions for the prenatal care systems in Durham County in order to establish better outcomes for healthier babies.

Abstracts

Brown, Lanisha (Bennett College for Women)

Detecting the Breakpoints of Williams Syndrome Using High Resolution Microarrays and Quantitative-PCR

Research Area: Neuroscience
Research Advisor: Dr. Julie R. Korenberg

Williams Syndrome (WS) is a rare neurodevelopmental genetic disorder that is associated with striking deficits in visual-spatial function, relative preservation of verbal processing and a gregarious personality. WS is caused by a small deletion of 1.5-1.8 megabases on chromosome 7 q11.23. We hypothesized that variations in the DNA sequence of single genes in the deleted region may identify genes correlated with phenotypic variations in WS. A precise deletion map was first determined by high resolution Illumina 1M Duo array analysis in 68 WS and 24 parents, including 12 trios. The centromeric breakpoint was located at 72, 589k - 72,726k, and the telomeric at 74,140k - 74,339k, yielding a 1.414 - 1.750 megabase deletion. To validate the breakpoints, we designed 25 primer sets spanning the single copy regions within and outside the typical deletion as well as the flanking repeated regions and did quantitative PCR (qPCR) using Taqman assays. The gene copy numbers determined by qPCR in the single copy regions supported the array predictions but did not support the array copy numbers in the flanking repeats with one exception. In the duplicated region, qPCR supported that the genes TRIM50 and the 5' end of NSUN5 were deleted in all WS. We note that the probes in the duplicated regions may pseudogenes and that the qPCR approach provides a more accurate measure of a specific sequence. These data may allow us to begin to evaluate the contribution of genetic variations to the cognitive and behavioral features of WS.

Cano-Mejia, Juliana (University of Virginia)

Platelet-Rich Plasma Isolation for Targeted Bone Tissue Engineering

Research Area: Tissue Engineering
Research Advisor: Dr. Edward Botchwey

Platelet-rich plasma (PRP) is an autologous source of platelet-derived growth factors and sphingosine 1-phosphate (S1P) that is obtained by isolating and concentrating platelets from whole blood through the process of centrifugation. Recent studies have shown that PRP's growth factors aid in the regeneration of bone and soft tissue, making it an appealing field of study for tissue engineering. S1P is a sphingolipid that is released from activated platelets during blood clotting. S1P acts through binding to five G protein-coupled receptors (S1P1-5), which can be manipulated through the use of various synthetic receptor agonists and antagonists. We hypothesized that activating platelets in PRP may lead to increased S1P concentrations which subsequently speeds osteogenesis at the site of a bone injury.
To test this hypothesis, PRP was isolated from blood of male C57Bl/6 mice, age 2-3 months. PRP was activated using a solution of 1 U/mL thrombin and 1 g/mL CaCl2, with 2 U/mL heparain used to prevent clotting. Lipids were extracted from PRP using methanol/chorloform and levels were quantified by HPLC/MS. MC3T3-E1 (mouse pre-osteoblast) cells were co-cultured with PRP alone and in conjunction with S1P (agonist for all S1P receptors), JTE-013 (an S1P2 antagonist) and FTY720-P (agonist for receptors S1P1, S1P3-5). After 24 hours, cell proliferation was quantified by calcein-AM staining. The greatest proliferation was found to result from a combination of JTE-013. Migration assays were conducted using a modified Boyden chamber assay that used PRP both with and without the above S1P agonists and to understand the role of these factors in mobilization and recruitment of bone precursor cells. Cells were seeded at a density of 5 x 104 cells per well and allowed to migrate over the course of four hours. Maximal migration was found using a combination of JTE-013 plus S1P plus 5% PRP.

Abstracts

Clark, Alicia (University of Virginia)

Disturbance of Dog Allergens to Report if Galactose-Alpha-1, 3-Galactose is Airborne

Research Area: Allergy
Research Advisor: Dr. Thomas Platts-Mills

Galactose-alpha-1, 3-galactose, also abbreviated as alpha gal, is an oligosaccharide commonly found on the proteins of non primate mammals. Growing numbers of patients, predominantly from the southeastern United States, have experienced anaphylaxis, angioedema (swelling), or urticaria (hives) 3-6 hours after consumption of this oligosaccharide. According to a previous study by Dr. Platts-Mills, alpha gal is also a major IgE binding epitope on cat IgA, which suggests that alpha gal may be airborne on cat dander. Thus, the purpose of this study is to determine whether or not this allergen can be inhaled. Doing this study may also provide insight into the relationship between the controlling factors of anaphylaxis and the controlling factors of asthma. Allergen collection in this study was performed two ways: ionic air filtration during disturbance in houses with dogs and sieving floor dust from a vacuum filter in houses with dogs. After extracting dust from these samples, we conducted an inhibition assay using I-125 labeled alpha gal to detect any alpha gal in the airborne particles. For the air filtered dust, the assay results showed very little evidence that alpha gal is airborne. Additionally, for the collection of sieved floor dust, we used the extracts to attempt to inhibit IgE binding to a dog epithelium Immuno CAP, which correlates well with IgE to alpha gal in affected patients. The results for this showed that alpha gal is not present. This data suggests that alpha gal does not cause asthma because it is not an inhaled allergen. However, once alpha gal is consumed by someone with IgE to alpha gal, whether they have a history of asthma or not, this is when alpha gal causes breathing problems along with the other anaphylactic symptoms or angioedema or urticaria.

Coates, Marcus (George Mason Univerity)

Moodle Integrated Synchronous Teaching and Conferencing (MIST/C)

Research Area: Computer Science
Research Advisor: Dr. Mark Pullen

The Moodle Integrated Synchronous Teaching and Conferencing tool (otherwise known as MIST/C) is a distance learning tool used to simulate as much of the in class experience as possible. Students using this tool and participating in a course using MIST/C can see and hear in real time the lecture slides, annotations, questions being presented, etc. The MIST/C Whiteboard is the central point of this piece of software. The user can upload powerpoint or pdf files for the other participants to view. Students can participate anywhere there is a high speed internet connection and if their computer meets the functionality standards. Through participation, the students can breakout into different groups, participate in voting sessions, save images to their personal directories, view and listen to old lecture recordings, ask questions to the class via chat or microphone audio, and even take the floor for speaking to the audience. MIST/C seeks to provide the user with real time synchronous teaching and learning capabilities that can't be covered by just simply reviewing an old lecture recording. With this tool, the participants are literally interacting with the other student and instructors via the web for a unique learning experience.

Abstracts

Cruz, Mariana (George Mason University)

Numerical Evaluation of Mode-II Delamination in Layered Fiber Reinforced Composites

Research Area: Civil Engineering, Structural Material Mechanics
Research Advisor: Dr. Girum S. Urgessa

Layered fiber reinforced composite materials are susceptible to crack initiation and growth in the resin rich layer between plies. These cracks, more commonly referred to as delaminations, represent one of the most prevalent life-limiting failure modes in laminated composite structures. This paper presents numerical evaluation of mode-II (forward shear) delamination using fracture mechanics approaches. Historical background about the methods used to investigate interlaminar fracture of composite laminates is presented. Results of compliance and strain energy release rate are presented based on a reinforced concrete beam strengthened with fiber reinforced polymer using a numerical model.

Dourassi, Bassam (George Mason University)

Communication Interface for a Prostate Cancer Simulator

Research Area: Systems Engineering
Research Advisor: Dr. Gregory Gerling

The prostate cancer simulator needs to communicate with the central command via a USB connection in real time using a C# graphical user interface. The simulator needs to be able to communicate with any giver master command across all operating systems.

Elsayed, Bilal (George Mason University)

Model-Based Methods for Fault Detection and Isolation

Research Area: System Diagnostics
Research Advisor: Dr. Janos Gertler

The focus of this research is on the detection and isolation of faults, including actuator malfunction, sensor biases, leaks, and other input-, output-, and plant-related faults in electrical and mechanical systems. This project will make use of the fact that linear systems may be modeled in terms of input-output relationships, usually expressed in terms of transfer functions/transfer function matrices. Residual generation will be the main method for fault isolation.

Abstracts

Espina, Marissa (University of Virginia)

Inquiry Based Learning with a Light Meter

Research Area: Physical Science Education
Research Advisor: Dr. Stephen Thornton and Dr. Richard Lindgren

The advantage of using probeware and other tools in science classrooms is that it enhances inquiry based learning. Involvement in the learning process leads to a better understanding of the subject matter. Moreover, much of the phenomena studied in physics classes are counter intuitive to how we typically view the world and how things should be, especially phenomena in light and optics. With a trip to RadioShack and Lowes (plus one online order) and using tools that any school teacher should have access to, I built a light meter for around $20 that can be used in middle school and high school classrooms for demonstrations, lessons and a Science Olympiad event.

Foster, Avis (George Mason University)

Extensions of the Cable Equation Incorporating Spatial Dependent Variations in Nerve Cell Diameter

Research Area: Mathematical Biology/Neuroscience
Research Advisor: Dr. Sergei Suslov and Dr. Marco Herrera

Neuronal function relies on electrical signaling which, in turn, depends greatly on the morphology of neurons. Local changes in the diameter of neurites caused by deformations such as tumors or enlarged cerebral aneurysms may significantly affect electrical conduction. Morphologically accurate models are typically constructed by representing neurons as branched cables. In this setting, a neuron is modeled as a system of coupled cable equations, each representing small neuronal segments as cylinders. Two extensions of the linear cable equation that allow the radius to change continuously space are constructed here by assuming that the radius of a neuronal segment changes to form a section of a cone or a hyperbolic volume. This research shows how different geometrical representations used to derive cable equations have varying impacts on the calculation of solutions.

Abstracts

Griffin, Merischia (Johnson C. Smith University)

The Effect of Ouabain on Sodium Potassium ATPase a1 in the Heart

Research Area: Biology
Research Advisor: Dr. Alexa Rosypol

Ouabain is a poisonous glycoside endogenous to mammals; it is produced in a nanomolar range in the central nervous system, adrenal cortex, and the heart. Exogenous administration of ouabainhas been shown to result in hypertension. Ouabain works by binding to the sodium potassium (Na+/K+) pump of a cell membrane. The function of the Na+/K+ pump is to regulate sodium and potassium concentrations. When a cell is depolarized, the enzyme Na+/K+ ATPase binds to the Na+/K+ pump, and the pump opens to allow two potassium ions to enter and three sodium ions to exit; this activates the sodium calcium exchanger (NCX). However, when ouabain binds to the enzyme Na+/K+ ATPase, it inhibits this reaction. This results in reversed activity of the NCX; normally a sodium ion wold be traded for a calcium ion, but in this situation the reverse occurs. This leads to opening of the calcium channel as well as release of more calcium from intracellular calcium stores. The influx of intracellular calcium produces an increase in ontractility of the heart muscle, which ultimately results in hypertension. The purpose of the study conducted was to observe the expression of the Na+/K+ATPase@1 isoform in rats after chronic and acute treatment. To complete the acute administration, whole heart samples from Spraugh-Dawley (SD) rats were harvested in either Locke's solution or Locke's solution with ouabain (1 mg/mL). After two hours of incubation, each heart was then subjected to electrophoresis and incubated in gel code-blue stain then exposed to scanning densitometry. A western blot was also completed for each sample. For chronic administration, SD rats were treated with 2ug/kg ouabain, while control rats were treated with a saline solution. After forty days the hearts were removed and homogenized. A protein assay was completed for each sample then equal amounts of protein were subjected to electrophoresis producing a western blot. The western blot was then analyzed using scanning densitometry. Results from the gel code-blue stain showed that there was no significant difference in the expression of Na+/K+ ATPase after acute administration of ouabian. Western blots of heart samples after acute administration also illustrated this. However, chronic administration of ouabian showed a trend towards decrease in Na+/K+ ATPase expression.

Harold, Virquan (Virginia Polytechnic Institute and State University)

Design and Development of SPME Holder Device for Underground Mine Rapid Air Sampling and Air Quality Analysis

Research Area: Mining Ventilation
Research Advisor: Dr. Kray Luxbacher

The focus of this research is to design an improved and inexpensive solid-phase microextraction (SPME) holder to enhance the quality and quantitative air sample analysis in a rugged environment, specifically underground coal mines. The information obtained through this SPME holder will allow rescue teams to quickly analyze the state of ventilation controls inside a mine and to help determine the nature and general location of damage. Therefore, providing background information on the conditions underground and hasting the decision to send rescue personnel into the mine. This SPME holder will be a tool for mining personnel and rescue teams to conduct safer and quicker rescue and recovery operations. Timing is very critical when miners are trapped underground with a limited supply of oxygen, exposure to excessive levels of methane, or injured.

Abstracts

Heart, DeAnthony (Virginia Polytechnic Institute and State University)

Near Earth Object Flexible Architecture

Research Area: Aerospace Sciences; Space Exploration
Research Advisor: Dr. Kevin Shinpaugh

The purpose of the Near-Earth Object (NEO) Flexible Mission Architecture is to conduct three manned-missions to NEOs during the 2025 to 2030 timeframe. Missions include both human and robotic surface and subsurface exploration and sampling pursuant to a broad range of astrogeological science goals. Value system design (VSD) was used to evaluate and compare potential design concepts pursuant to RASC-AL's NEO mission architecture theme statement. Specific attention is paid to the inclusion of commercial partners and the development of sustainable and adaptable space exploration systems.

Jeffrey, Sarah (University of Virginia)

Granuloma Imaging: Microbubbles & Luciferase

Research Area: Immunology
Research Advisor: Dr. Kenneth Tung

Vasectomy is a very common procedure performed as a permanent form of birth control. There have been cases that show that this procedure leads to the formation of an organized tissue inflammation known as a granuloma. In order to determine what influences T-reg has on the outcome of these granulomas, we attempt to discover noninvasive methods for their imaging. The purpose of my research is to explore two techniques that will possibly permit the detection of the inflammation in the epididymal tissue. The first technique uses microbubbles as ultrasound contrast agents, and the second uses the luciferase enzyme as a form of bioluminescent imaging. Of the two techniques explored in this study, that of the bioluminescent enzyme luciferase seems more promising for the long-term imaging purposes, while the other, does not seem to even have short-term utilization.

Judd, Rika (Virginia Polytechnic Institute and State University)

Variation in Observed Salamander Skin Bacterial Communities with Multiple Swabbing

Research Area: Microbiology
Research Advisor: Dr. Lisa Belden

Chytridiomycosis is an infectious amphibian disease responsible for many amphibian population declines. The skin microbiota of amphibians may prevent this disease in some instances. Most experiments examining amphibian skin microbiota involve sequential swabbing of amphibian skin for sample collection. My study used culturing and DGGE analysis to examine whether there was a difference in the bacterial diversity among three sequential swabs collected from individual newts. In general, the bacterial diversity decreased with each swab, which needs to be considered in future experiments.

Abstracts

Lahlou, Tarek (George Mason University)

RHEED Image Analysis on Epitaxial Niobium Thin Films

Research Area: Electrical Engineering
Research Advisor: Dr. R. A. Lukaszew

The need to improve superconducting thin film coatings for radio frequency (SRF) cavities used in linear accelerators, has inspired recent niobium thin film research. To better understand the SRF properties in thin film niobium, correlated studies of structure, surface morphology and SRF performance are underway. Here we present our recent work on epitaxial growth of niobium on a-plane sapphire as model system. This includes an in-depth look at the variation in the strain of the film versus its thickness by measuring the lattice parameter of the surface layer using reflection high- energy electron diffraction (RHEED).

Latore, Michaila (Virginia Polytechnic Institute and State University)

Inhibition of E2 Viral Protein to DC-SIGN of Dendritic Cell Can Lead to Advancement in Drug Therapuetics

Research Area: Biochemistry; Molecular Modeling
Research Advisor: Dr. David Bevan

Recent data shows that approximately 300 million people are infected with hepatitis C virus. Of that 300 million, 4.1 million are Americans suffering from the virus. The means in which the Hepatitis C virus (HCV) is spread places a necessity of treatments for those affected even over the importance of producing preventative treatment methods. There currently is a cure for both hepatitis A and B, however HCV is currently declared incurable. The virus is spread through blood to blood contact, which stem from preventable causes such as sharing of needles for injection drug use to accidental needle sticks in health care settings and birth to HCV- infected mothers. Computational Protein-Protein docking is method that simulates what occurs biologically. Through this method the interaction between proteins on the HCV and the dendritic cell of the immune system it binds to is studied, in hopes to inhibit HCV propagation. Reconstruction of the viral protein in the complex to act as an inhibitor will hopefully prevent the virus from being able to attach the cell and thus making it unable to propagate. The creation of a simulated protein to bind to the receptor on the HCV will inhibit the binding of the virus to the actual cell. The likelihood of the virus to bind to the simulated model is dependent on the affinity the virus has to it. By ensuring a high affinity of the model; the study can produce positive results were the HCV is inhibited to propagate. This model can then be used in therapeutic advancements as a treatment to HCV.

Abstracts

Manley, Matthew (University of Virginia)

Software for the Identification of Organization Names and Countries Corresponding to IP Addresses

Research Area: Computer Networking
Research Advisor: Dr. Malathi Veeraraghavan

The Department of Energy deploys a hybrid network, ESnet1, in order to support two independent services: an IP based service for normal traffic and a dynamic circuit service for extremely large file transfers. However, ESnet is not able to fully utilize both services because it lacks a control structure that determines when and/or how to redirect large file transfers to the circuit service. This research project is in support of an overall DOE-funded project to develop a new prototype system, the Hybrid Network Traffic Engineering Software (HNTES)2 system, which will enable such redirection. A reverse IP-lookup software module is required, which determines the name of the owning organization and its country for each IP address encountered in flows monitored by the HNTES system. Design and implementation of this software module is the primary objective of this REU research project. This program reads in the output of another component on HTNES, in the form of a file containing the IP addresses carried in flows, and looks up the organization that owns each of these IP addresses as well as the country they are located in. It uses the "whois" command3 supported by Linux systems. The software then populates a MySQL database with the information obtained for each IP address that is then used by another component of the HNTES system. The program was successfully integrated into the overall HNTES system, and functions as expected. The IP-lookup program is an important part of the software because it provides users of HNTES additional information that is not directly discernible from IP addresses. On a larger scale, this software will greatly improve efficiency of network usage for ESnet and other comparable networks since redirecting larger flows to circuits will allow for the IP service to be operated at higher occupancy levels. This software could also be used by other government or private organizations that regularly transmit extremely large files.

Abstracts

Mays, Jasmine (Johnson C. Smith University)
Speas, Anthony (Johnson C. Smith University)
Seabrooks-Matthews, Arianna (Virginia Polytechnic Institute and State University)

Identification of Molecules through Experimental and Computational Spectroscopy

Research Area: Chemistry
Research Advisor: Dr. Brooks Pate, Dr. Daniel Zaleski and Dr. Amanda Steber

The research goal was to gain an understanding of the reactive chemistry in the interstellar medium through the use of rotational spectroscopy to study methyl and ethyl formate. The main focus of the experiment was to identify trans methyl formate in the interstellar medium. There are two conformers of methyl formate - cis and trans - which are based upon its rotation about the heavy atom dihedral angle. For a long time, the more abundant cis conformer of methyl formate had been known to exist in the interstellar medium. Until recently, the interstellar detection of the higher energy trans- methyl formate had not been seen because its laboratory spectrum was unknown. Based on terrestrial abundances of cis and trans methyl formate, its interstellar presence would be doubtful. With a laboratory spectrum in place, Muckle et al. posed a question on the interstellar formation of trans- methyl formate. Based on two proposed theoretical pathways, it was determined that when using one reaction pathway (the Fischer Esterifaction), cis methyl formate was more favorable than trans ; however, another possible barrier reaction pathway (the methyl transfer reaction) helped explain the abundance of trans- methyl. Based on correlations between experimental and theoretical evidence, the GBT was used in the detection of interstellar trans- methyl formate. Based on data collected, it was confirmed that both cis and trans methyl formate are, in fact, the interstellar medium. The cis was determined as the more energetically favorable molecule. The spectra identified the two states, A and E, that were due to the internal rotation of the methyl group. Furthermore, it was possible to conclude that based on the results obtained in the lab, and based on comparisons in the GBT primos data trans- methyl formate was detected in the interstellar medium. In fact, the amount of trans methyl formate seen in the interstellar medium seems to suggest kinetic control rather than thermodynamics.

Molina, Alan (University of Virginia)

Fabrication of Nanofibrous Blend Polymer Scaffold for Wound Healing

Research Area: Biomedical Engineering
Research Advisor: Dr. Edward Botchwey

Traditional skin grafting techniques suffer from engraftment failure due to infection, hematoma, and poor vascularization. Nanofiber scaffolds are used in tissue engineering since they exhibit morphological features similar to the extracellular membrane (ECM) of human tissue. Electrospinning is frequently employed in the construction of such scaffolds. An electrospun synthetic skin graft incorporating the structural integrity of polycaprolactone (PCL), a synthetic and biodegradable polymer, chitosan, a natural polymer that exhibits antibacterial properties, and the angiogenic properties of adipose derived stem cells (ASCs) provides an alternative to traditional skin grafts. PCL-chitosan scaffolds offer decreased rates of infection and hematoma in addition to increased vascularization. PCL-chitosan nanofibers were successfully electrospun and characterized. Issues surrounding the stability of chitosan's antibacterial properties and solubility in slightly basic solution were investigated. Investigation of the degradation properties and past research on the antibacterial properties of chitosan indicate that further efforts towards preserving chitosan's charge and insolubility in slightly alkaline solution are necessary. A suggested solution is the chemical cross-linking of the scaffold followed by the quaternization of the secondary amine groups on chitosan.

Abstracts

Moore, Alycia Chanel (University of Virginia)

Characterizing the Nature of the Xst199 Mutation and the Normal Function of the TANGO1 Protein in Trophoblast Cells

Research Area: Cell Biology
Research Advisor: Dr. Ann Sutherland

The focus of this study is to evaluate how the TANGO1 protein contributes to trophoblast differentiation in mutated and normal trophoblast cells. These cells are the primary and structural elements of the placenta. Trophoblast cells originate from the trophectoderm layer of the blastocyst, and differentiate to form the mature placenta. Failure of trophoblast cells to properly differentiate can lead to placental dysfunction, which directly affects the growth and development of the fetus, resulting in fetal death or abnormal growth. Previous inquiry has shown that mice homozygous for the Xst199 mutation develop a placenta that is poorly structured and lacks fetal blood vessels, consequently leading to fetal death. In order to investigate the function of the protein TANGO1 in placental development, mouse embryos isolated at E6.5, E7.5, and E9.5 heterozygous for the Xst199 mutation were stained to localize the expression of the gene trap construct that carries the Mia3 gene. Results show that in embryos dating E6.5 and E7.5 the Mia3 gene is localized in the placental precursors, namely the ectoplacental cone and the chorion regions of the embryos. Future studies will examine the expression of trophoblast marker genes to understand the function of the Mia3 gene and the TANGO1 protein in trophoblast differentiation. Knowing how the TANGO1 protein is involved the trophoblast differentiation process will allows us to more thoroughly understand how these factors regulate the behavior of trophoblast cells during placental morphogenesis.

Moore, Ashley (Johnson C. Smith University)

Chord Recognition through Wavelet Analysis

Research Area: Mathematics
Research Advisor: Dr. Dawn B. McNair and Dr. Sue Geller

Wavelet analysis is a technique used in signal processing. Many factories implement the use of wavelet analysis in identifying machine malfunctions. The notification of a machine malfunction is linked to a specific signal. The purpose of this project is to develop an algorithm to distinguish differences in signal pitch. We modeled this concept by using guitar chords (B Minor, E minor, and F minor) and decomposed each chord using MatLab. We discovered that our algorithm found the most probable chords which had the least amount of error. Future research would include developing an algorithm that recognizes overtones.

Abstracts

Pearson, Shoteria (Bennett College for Women)

Does the Sharing of Unclean Syringes Increase the Risk of Contracting HIV and HCV?

Research Area: Public Health
Research Advisor: Dr. Brigit Carter

Injection drug use accounts for more than one fifth of all HIV infections and most Hepatitis-C infections in the Unites States. To be successful in effectively reducing the transmission of HIV and other blood borne infections, programs need to strategize how to gain the trust of IDUs. One of the most important strategies is to provide IDUs with sterile syringes. The study's objective is to determine whether pharmacies will sell syringes to IDUs and collect biohazard. Also, to assess the risk and rates of HIV/HCV to determine if SEPs in North Carolina would be beneficial in reducing the number of occurrences and to determine whether this would vary by pharmacy. Within this study 70 pharmacies were asked a series of questions regarding selling syringes to IDUs. The pharmacies were visited to determine if they would sell 10 packs of U100 insulin syringes. There were randomized checks of both dependent and independent pharmacies and I was successful in purchasing syringes. SEP would be beneficial in North Carolina to lower the risk and rates of HIV/HCV. More research needs to be done to confirm this investigation's findings and also the consideration of changing North Carolina's policy.

Robinson, Laijia (Elizabeth City State University)

The Effects of Traditional Zimbabwe Medicinal Plants on Caspase-3 and Beta-Amyloid Cytotoxicity

Research Area: Chemistry

Healing properties of various plants have been explored by people for ages. In parts of rural Africa, there is about 1 doctor to 500 patients and the traditional medicinal healers believe not only in the healing abilities of the plants that they use, but also in their religion. Euclea Natalensis is a traditional Zimbabwe medicinal plant used medically to treat headaches, chest complaints, urinary tract infections, and venereal diseases. The roots and/or bark are used as an ingredient in a variety of traditional remedies, to treat worms, stomach disorders, and toothaches. Crossopteryx febrifuga is also a traditional Zimbabwe medicinal plant and its bark is used for the treatment of dysentery, diarrhea and fever. Alzheimer's disease (AD) is a progressive and fatal brain disease that occurs in response to the premature death of neurons. African-Americans and Hispanics are at higher risk for developing AD. African-Americans are about twice as likely to have AD than whites, and Hispanics are about 1.5 times more likely than whites to develop the disease. Cognitive function in AD is a result of the loss of valuable neurons through apoptosis.

Abstracts

Shealey, Glasser (Elizabeth City State University)

Model for Studying Epigenetic Memory of Hypermethylator Breast Cancer Cell Lines

Research Area: Biology
Research Advisor: Dr. Ephraim Gwebu

Primary breast cancers and breast cancer cell lines frequently exhibit a hypermethylator phenotype characterized by hyperactivity of DNA methyltransfearse (DNMT) enzyme activity, overexpression of DNMT3b protein, and methylation-dependent silencing of numerous genes. While aberrant methylation is known to be a feature of many breast cancers, the molecular mechanisms that lead to this abnormality are not yet established. A major question is whether the state of the breast cancer epigenome reflects an enduring epigenetic accident or active dysregulation of the DNA methylation machinery. The overarching purpose of this project was to establish a model system to examine this basic question. In this model system, MDA-MB-453 breast cancer cells were exposed to 5-aza-2'-dexoxycytidine (5-aza) to effect demethylation of the genome followed by release from 5-aza treatment to allow remethylation to occur. The expression of methylation-sensitive genes was examined over multiple cycles of treatment (demethylation) and recovery (remethylation). Each cycle included one week of 5-aza treatment followed by a one week recovery period. We hypothesize that if the breast cancer epigenome reflects an enduring epigenetic accident that multiple cycles of demethylating treatment will reporogram the breast cancer cells. In contrast, if the breast cancer epigenome reflects active dysregulation of the methylation machinery, we expect to observe persistent epigenetic memory after numerous cycles of demethylating treatment. Discernment of these fundamental biological questions holds implications for targeting the breast cancer epigenome to improve therapy for hypermethylator breast cancers.

Smith, Keyona (Bennett College for Women)

The Effectiveness of Upper Extremity Exercise Device on Individuals with Disabilities

Research Area: Biology
Research Advisor: Dr. Theresa Crytzer and Dr. Brad Dicianno

Obesity, deconditioning, cognitive impairment, and poor exercise tolerance are health issues concerning individuals with spina bifida (SB). Our aim is to identify motivating tactics and exercise devices to increase participation in exercise. The GameCycle is an alternative to standard arm ergometry, coupled to a video game system displaying racing cars or trucks driven by rotation of the arm cranks. iPing and textinghome are low cost online services that send personalized electronic voice message reminders to exercise. We hypothesized the GameCycle and electronic reminders would contribute to greater participant attendance of sessions during a sixteen-week exercise program. Nineteen individuals were randomized into Gamecycle versus standard ergometry groups. For 8 weeks, participants in each exercise group were randomized to receive text/voice reminders or no reminders, and then were crossed over to text/voice or no text/voice after 8 weeks of exercise. Other measures, including the Physical Activity Scale for Individuals with Disabilities and the Groningen Enjoyment Questionnaire (GEQ) were obtained at baseline and 8 and 16 weeks. No significant differences were observed in baseline demographics between text/voice reminder and between exercise groups. Regression analysis revealed GEQ score, rather than exercise or reminder group, was the most significant contributing factor to number of sessions attended, suggesting participation in exercise is more likely a function of individual enjoyment of the experience rather than equipment or reminders being used. Future studies with larger cohorts may identify ways to keep individuals with multiple disabilities on a fixed exercise schedule.

Abstracts

Taylor, Tarreyca (Elizabeth City State University)

The Biodiversity and Community Analysis of Nematodes in Lake Phelps, North Carolina

Research Area: Biology
Research Advisor: Dr. Euyalem Abebe

The phylum Nematoda comprises of a wide range of roundworms that are rarely studied due to an array of diversity and difficulty of classification. They are essential to the environment because they are indicators of environmental disturbance. Freshwater nematodes from Lake Phelps, North Carolina were extracted, identified and analyzed to determine the biodiversity of the lake. Lake Phelps is a large freshwater lake with particularly clear water. It has no connecting streams or rivers and the origin is unknown. Four sites surrounding the lake were sampled using a hand corer. Nematodes were extracted from the samples using Whitehead Tray extraction method and density-based centrifugation. The nematodes were mounted on slides using a fixation technique and then identified using a freshwater genera taxonomic key. The maturity index, which is an environmental parameter used to approximate the cleanliness of a body of water, was calculated to be 2.23. The maturity index ranges from 1-5, 1 indicating extreme environmental disturbance and 5 indicating a pristine environment.

Wright, Jamie (University of Virginia)

Utilizing Micro-Computed Tomography (μ-CT) Scan Data to Create Finite Element Models of Lower Limb Bones
Research Area: Biomechanics
Research Advisor: Dr. Costin Untaroiu

Standard methods in the finite element (FE) modeling of cortical bone include its characterization as a homogeneous, isotropic material, which do not correspond to the actual properties of human bone. Research based on accurately incorporating human characteristics is important in predicting human response during crash incidents through numerical human models, which are an efficient and optimal way of determining safety requirements. By extracting micro-CT scan data from a previous bone coupon test performed on femoral and tibial samples, we will be able to create different finite element models. Following stages include importing models and simulating tensile test experiments using finite element software to analyze the differences in behavior when each model is subjected to a specific displacement input. The first model created is a simplified, homogeneous version of the bone sample composed of all averages of reported material properties. The second model is a comprehensive version, in which we will assign more detailed material properties to account for the change in geometry. Material properties are assigned according to different relationships between Hounsfield Units, Young's Elastic Modulus, and bone density of each coupon. Upon the completion of the tensile test simulations, we will specifically look at each model's response in terms of stiffness and strain distribution.

NOTES

NOTES

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Speakers: Rosalyn Hobson and Michelle Jackson

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HIGHLIGHTS

Above, summer program students discuss their findings during a campus-wide summer research poster presentation session.

■ The Third Annual VA-NC Alliance Symposium, hosted by partner school Bennett College for Women registered eighty-nine Alliance students and faculty for a variety of workshops and research presentations.

■ Partner institution Virginia Polytechnic Institute and State University welcomed over fifty Alliance students to the Third Annual Graduate School Preparation Retreat.

■ The VA-NC Alliance initiated a new summer research program in 2010. Twelve Alliance students spent eight intensive weeks in this collaboration with the University of Virginia's Center for Chemistry of the Universe, and the Department of Systems and Information Engineering. Students collected data at the National Radio Astronomy Observatory in Green Bank, West Virginia.

Below, summer program students & staff pose for a group photo at the top of the 485-foot tall Robert C. Byrd Telescope

VA-NC Alliance Management Team

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The VA-NC Alliance is an alliance of eight partner institutions in Virginia and North Carolina increasing the number of underrepresented minorities earning STEM degrees by 2012. Through synergistic partnership the VA-NC Alliance offers summer bridge programs, summer research experiences, annual symposia, common reading experiences, mentoring, tutoring, and preparation for graduate school.

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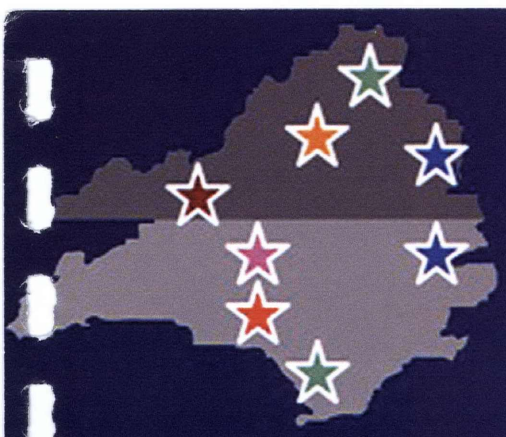

VIRGINIA/NORTH CAROLINA
ALLIANCE
for Minority Participation

The Virginia/North Carolina Alliance

IMPACT

NSF and the VA-NC Alliance... making a difference!

	Year One	Year Three
Graduates: The total number of STEM students graduating from VA-NC Alliance partner institutions increased approximately 20% from year one to year three.	488	583
Enrollment: Enrollment of underrepresented minority students has increased in the Alliance, with particular success in mathematics compared to national trends in higher education.	3,469	3,948
Direct Participants: The Alliance increased the number of its direct participants by over 136% from year one to year three with gains across all racial and ethnic groups.	219	518

Activities:
Attendance at Alliance annual events increased, including the Alliance Symposium and the Graduate School Preparation Retreat. The number of students participating in undergraduate research opportunities increased over 93% from year one to year three. During year three, partners distributed over 160 book stipends through the Alliance.

Results from a satisfaction survey showed that at least 65% or more Alliance students were satisfied with socialization into their discipline, feelings of belonging, and the ability to conduct independent research in their discipline. Ninety percent of students have discussed the Alliance with friends, and encouraged them to participate. Feedback from students indicates several particularly effective aspects of the program:

- assistance and peer advice for the graduate school application process and employment applications
- a great way for students to get experience at nationally recognized research facilities
- helps students remain competitive and academically focused by making available tutors, book stipends, and financial assistance with housing and other expenses
- the chance to experience collaborative research in multiple disciplines

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The Virginia - North Carolina Alliance

Bennett College for Women

Elizabeth City State University

George Mason University

Johnson C. Smith University

Saint Augustine's College

University of Virginia

Virginia Commonwealth University

Virginia Polytechnic Institute and State University

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