

PROGRAM BOOK

# Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)

2007 National Research Conference

4-7 October 2007 • Washington, DC



## **About the National Science Foundation (NSF) Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)**

The NSF HBCU-UP provides grants to enhance the quality of undergraduate science, technology, engineering, and mathematics (STEM) education and research at Historically Black Colleges and Universities (HBCUs) as a means to broaden participation in the Nation's STEM workforce. Support is available for Implementation Projects, Planning Grants, Education Research Projects, and Targeted Infusion Projects.

Implementation Projects provide support to implement a comprehensive institutional project to strengthen STEM education and research. Proposed activities and strategies should: Be the result of an institutional STEM self-analysis; address institutional and NSF goals; and have the potential to result in significant and sustainable improvements in STEM program offerings. Typical project implementation strategies include: Curriculum enhancement, faculty professional development, undergraduate research, academic enrichment, student support services, infusion of technology to enhance STEM instruction, collaborations with research institutions and industry, and other activities that enhance the quality of the undergraduate STEM education program. Proposers are encouraged to analyze the strengths of the institution and design innovative educational strategies, based on proven best practices, to place the institution at the forefront of undergraduate STEM education.

Planning Grants provide support to undertake self-analysis of the institution's undergraduate STEM programs to identify components that need improvement or enhancement in order to provide a high quality undergraduate STEM education. Planning grants should also research existing activities and strategies that could be implemented to improve the quality of undergraduate STEM education at the institution. Typical activities include: Data collection and analysis, stakeholder consultation, research of potential activities and strategies, site visits to model programs, and writing an Implementation Project proposal.

Education Research Projects provide support to undertake a three-year education research project that has the potential to strengthen the STEM education and research programs at HBCUs. Education Research Projects must be based on sound education research methodologies and theories. Potential education research topics include: Retention, diffusion of innovations, curricula enhancements, technology in education, STEM teacher education, and the identification of successful models. This is not a supplemental program - HBCUs do not need to have an Implementation Project in order to submit ERP proposals.

Targeted Infusion Projects provide support to achieve a short-term, well-defined goal to improve the quality of undergraduate STEM education. Typically, projects are focused on one activity within a single STEM department however interdisciplinary and cross disciplinary projects are encouraged. Potential goals include: Specialized accreditation or certifications, establishing new programs or concentrations, establishing collaborations between STEM disciplines and teacher education programs, and updating programs to reflect advances in the field and workforce requirements. This is not a supplemental program - HBCUs do not need to have an Implementation Project in order to submit a TIP proposal.

HBCU-UP is a program of the National Science Foundation (NSF). NSF is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense..." With an annual budget of about \$5.92 billion, NSF is the funding source for approximately 20 percent of all federally supported basic research conducted by America's colleges and universities. In many fields such as mathematics, computer science and the social sciences, NSF is the major source of federal backing.

For information about the HBCU-UP visit the Web site [http://nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5481&org=EHR&from=home](http://nsf.gov/funding/pgm_summ.jsp?pims_id=5481&org=EHR&from=home)

# Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)

2007 National Research Conference

Science and Technology: Knowledge Generators  
for Global Competitiveness

October 4–7, 2007  
Grand Hyatt Washington Hotel, Washington D.C.

Cosponsored by

American Association for the Advancement of Science (AAAS)  
Directorate for Education and Human Resources Programs

National Science Foundation  
Directorate for Education & Human Resources  
Division of Human Resource Development

Visit the conference Web Site later in December 2007 for information on the  
2008 HBCU-UP National Research Conference – [www.hbcu-up.org](http://www.hbcu-up.org)



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Cover photos of researchers, faculty,  
and students courtesy of USDA

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# Welcome to the HBCU-UP Conference



Larry Mattix



Sadanand Srivastava

Dear HBCU-UP Conference Participants:

The Conference Advisory Board welcomes you to the 8th Annual Historically Black Colleges and Universities Undergraduate Program (HBCU-UP) National Research Conference. Our 2007 Conference theme, “Science and Technology: Knowledge Generators for Global Competitiveness” affirms our commitment to meeting the challenges of preparing science, technology, engineering, and mathematics (STEM) students for a globally competitive workforce.

We have an exciting program which will be both informative and fun! Highlights include a Faculty Pre-Conference Workshop on Thursday, October 4, 2007, which will provide information on how to apply for an HBCU-UP grant. It will also share tips on (1) facilitating cross-disciplinary communication of innovative curriculum ideas; (2) effective implementation of undergraduate research programs; and (3) evaluating STEM-broadening participation programs.

Friday and Saturday (October 5th and 6th) will feature student oral and poster presentations as well as interactive professional development sessions that will provide significant networking opportunities. We are excited that seventy-one academic institutions, organizations, foundations, professional societies, federal agencies offering services and programs for minority students in the Science, Technology, Engineering, and Mathematics (STEM) and Behavioral Sciences will be showcasing information on fellowships, graduate and undergraduate programs, postdoctoral training opportunities, and student memberships during the 2007 HBCU-UP exhibition.

The Award Banquet on Saturday, October 6th, will recognize and celebrate students for their outstanding accomplishments. In addition, the inaugural “Talent Showcase” will provide students with the opportunity to relax and share their talents in music, poetry, drama, and dance. We conclude our activities on Sunday morning with a brunch.

We look forward to your participation and feel certain that the Conference will result in a rejuvenated spirit dedicated to ensuring that the nation’s talent can reach their full potential in the STEM fields.

Larry Mattix, Norfolk State University

Sadanand Srivastava, Bowie State University

HBCU-UP Conference Co-Chairs

# Welcome to Washington, DC

Dear HBCU-UP Faculty and Students:

On behalf of the Directorate for Education and Human Resources at the National Science Foundation (NSF), I want to welcome you to the 2007 HBCU-UP Student Research Conference. The conference theme Science and Technology: Knowledge Generators for Global Competitiveness resonates with the mission and core values of NSF. We support research and education that is creative and visionary, and we are dedicated to enabling excellence in science, technology, engineering, and mathematics (STEM) by being broadly inclusive and accountable in an increasingly global society. Your participation in this conference is a reflection of these values and illustrates your dedication to improving the STEM enterprise.

We at NSF, believe that you are co-investors in the Agency's mission to foster research at the frontiers of knowledge. You help to strengthen and to sustain our nation's research capability through your discoveries and through your willingness to advance STEM education. For that, I say, "Thank you."

To the student participants, I encourage you to learn from each other and from the STEM research faculty who are serving as your mentors. You have an opportunity to forge networks with some of the brightest minds in the country. Take advantage of this unique gathering to showcase your expertise.

Remember, we welcome your comments and suggestions as we continually evaluate how better to serve you and to transform postsecondary STEM education.

Enjoy the conference!

Cora B. Marrett  
Assistant Director  
Directorate for Education and Human Resources  
National Science Foundation



Cora B. Marrett

# Welcome to the HBCU-UP Conference



Victor A. Santiago

Dear Participants:

On behalf of the National Science Foundation's Division of Human Resources Development, I welcome you to the 2007 HBCU-UP Student Research Conference.

Student research provides opportunities to link classroom learning with laboratory experience, and prepares undergraduate students for graduate school. It is particularly important as an ingredient in training scientists for the R&D workforce. Research experiences allow our skills to develop, and capture the imagination, providing a platform from which exciting discoveries emerge.

This meeting provides you – whether a student researcher or a faculty member – many pathways to explore new ideas in science, mathematics, engineering and technology, whether through presentations, workshops, or networking conversations. I offer you, the students who are attending, my personal congratulations on your research and on the presentations you are making at this conference. And to the faculty, I offer my appreciation for the guidance and support you provide to your students, and the role model you pose on campus and here at the conference.

You and your faculty sponsor are part of the vanguard of America's future in science and technology. The National Science Foundation is proud to play a role in your developing career.

Victor A. Santiago  
Acting Division Director  
Division of Human Resources Development  
Education and Human Resources Directorate  
National Science Foundation



# Welcome to Washington, DC

Dear HBCU-UP Conference Attendee:

Welcome to Washington, D.C. and to this conference celebrating your education and research achievements. We hope you use this occasion to expand your professional networks, to identify potential colleagues and collaborators, and to consider your career and educational options and opportunities.

AAAS welcomes you to our headquarter's city where over 400 staff work to develop programs in science and technology policy, STEM education and careers, and international science, as well as the weekly publication of *Science*, the premier science journal in the world.

We are interested in hearing from you as to how we can, as the largest general science organization in the world, help you identify and fulfill your career goals and aspirations in STEM. We offer career resources online, as well as career workshops around the United States as a major component of our Annual Meeting. Please join us in Boston in February 2008 as well as on the web at <http://sciencecareers.sciencemag.org/> and <http://www.aaas.org/careercenter/>.

Shirley M. Malcom

Director

AAAS Directorate for Education and  
Human Resources Programs



Shirley M. Malcom

# General Information for All Attendees

## Cell Phone Usage

All cell phones MUST BE turned off before you enter session rooms out of courtesy for speakers and session participants.

## Dress Code

We recommend that participants dress in business attire for the exhibits, for poster and oral presentations, and for concurrent student and faculty sessions. Business casual attire is suggested for other Conference activities.

## E-Mail Center

Two (2) computers will be available in the registration area for attendees to receive and send emails during the conference. PLEASE LIMIT YOUR SESSION TO 5 MINUTES.

## Evaluation

Conference evaluation forms will be available immediately after each session and will also be sent by email to all attendees immediately following the Conference. Please take advantage of this opportunity to share with us your views and opinions regarding the HBCU-UP Conference.

## Exhibits

Exhibition Program Schedule:

Friday, October 5, 2007	12:00 noon – 3:00 p.m. and 5:30 p.m. – 8:30 p.m.
Saturday, October 6, 2007	9:00 a.m. – 12:00 noon

## Name Badge & Badge Replacement Fee

Name badges are to be worn AT ALL TIMES. Badges permit attendees to enter ALL sessions, exhibition area, conference meals, and e-mail center. THERE WILL BE A \$50.00 CHARGE FOR BADGE REPLACEMENT.

## Message Board

A message board will be displayed in the registration area. The message board is a great location for attendees to post messages, job openings, upcoming events, or announcements.

## 2007 HBCU-UP National Research Conference Advisory Board and Staff

### CO-CHAIRS

#### **Larry Mattix**

Associate Dean, School of Science and Technology,  
Norfolk State University

#### **Sadanand Srivastava**

Chair & Professor of Computer Science,  
Bowie State University

### MEMBERS

#### **Teresa Edwards**

AAAS Committee on Opportunities in Science (COOS) Liaison,  
Associate Professor, Georgia Gwinnett College

#### **Caesar R. Jackson**

Dean, College of Science and Technology,  
North Carolina Central University

#### **Adriane Ludwick**

Professor, Department of Chemistry, College of Architecture,  
Environmental & Natural Sciences, Tuskegee University

#### **Joe Omojola**

Professor of Mathematics and Physics,  
Southern University at New Orleans

#### **Sandra (Sandy) Thomas**

Executive Director, IGERT National Recruitment Program,  
Institute for Broadening Participation

#### **Nancy Greer-Williams**

Dean, Liberal Arts/Social Sciences  
University of Arkansas for Medical Sciences (UAMS)

## Key AAAS EHR HBCU-UP Project Staff

### DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES (EHR) PROGRAMS

Shirley M. Malcom, Director  
Yolanda S. George, Deputy Director

### SENIOR STAFF

Lenell Allen  
Donna Behar  
Tracy Compton  
Cathy Ledec  
Marty McGihon  
Richard Weibl

### PROJECT ASSISTANTS

Crystal Addison  
Jessica Dunton  
Cursilla Fenwick  
Jessica Kunkler  
Trevia Newell  
Nicole A Nicholson  
Adedolapo Owolabi  
Amani Rushing

### OFFICE OF PUBLIC PROGRAMS

Sandra Audia  
Edward Lempinen  
Donald Norwood

### SCIENCE AND POLICY PROGRAMS

Joanne Carney

## Key National Science Foundation HBCU-UP Leadership and Staff

### DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES (EHR), OFFICE OF THE ASSISTANT DIRECTOR

Cora Marrett, Assistant Director  
Wanda E. Ward, Deputy Assistant Director

### DIVISION OF HUMAN RESOURCES DEVELOPMENT (HRD)

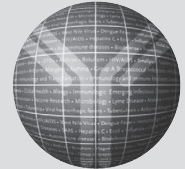
Victor A. Santiago, Acting Division Director

### HISTORICALLY BLACK COLLEGES AND UNIVERSITIES UNDERGRADUATE PROGRAM (HBCU-UP)

Camille A. McKayle, Program Director  
Marilyn J. Suiter, Program Director  
Jessie DeAro, Program Director



# Help Us Help Millions



## **NIAID needs you because the world needs us.**

Recognized worldwide for our cutting edge medical and scientific research, NIAID has a responsibility to improve global health in the 21st Century. NIAID conducts and supports basic and applied research to better understand, treat, and ultimately prevent infectious, immunologic, and allergic diseases. With the availability of powerful new research tools, our basic and applied research programs provide the essential elements to enhance our defenses against bioterrorism, HIV/AIDS, asthma, emerging and re-emerging infectious diseases and enhance vaccine research.

NIAID offers various career development grants, research training and fellowships to develop and support the next generation of biomedical researchers; enabling students to gain valuable education and research experience. To learn more about NIAID's available training and career grants, please visit: [www.niaid.nih.gov/ncn/training/advice/index.htm](http://www.niaid.nih.gov/ncn/training/advice/index.htm). For information about NIH's available student training programs, please visit: <http://www.training.nih.gov/student>.

Join the fight for global health. Work with some of the most talented investigators and help enhance our defenses against some of the world's most deadliest diseases.

## **Please join us at our booth during the HBCU-UP conference! Learn about NIAID and our available opportunities!**

Your individual talents are needed to help us complete our mission. NIAID is continuously searching for qualified:

- Medical Officers
- Program and Management Specialists
- Technical Writer-Editors
- Several other Scientific and Business Management Specialists

These positions are subject to a background investigation

**To learn more about NIAID and to view our available job opportunities, please visit:  
<http://healthresearch.niaid.nih.gov/nrc> or contact us at 1-888-798-4991.**

The NIAID is committed to maintaining its stature as a premier research institution by building an inclusive workforce through the Workplace Diversity Initiative and Affirmative Action programs. The NIAID's commitment to equal opportunity and diversity in recruiting, hiring and career development will help ensure the continued output of excellent science.



Department of Health and Human Services  
National Institutes of Health  
National Institute of Allergy and Infectious Diseases  
DHHS and NIH are Proud to be Equal Opportunity Employers

Thursday, October 4, 2007

7:00 AM – 7:30PM

## REGISTRATION

*Independence Foyer, Independence Level*

8:00 AM – 8:30 AM

## CONTINENTAL BREAKFAST

8:00 AM – 3:00 PM

## FACULTY WORKSHOP

*Conference Theater, Lagoon Level*

8:30 AM – 8:45AM

## WELCOME, OVERVIEW & INTRODUCTION

**Camille A. McKayle**, Program Director, NSF Division of Human Resources Development (HRD) & University of the Virgin Islands (UVI)

**Yolanda S. George**, Deputy Director, AAAS Directorate for Education & Human Resources Programs

8:45 AM – 10:15 AM

## EVALUATION SECRETS & GENERAL Q & A

**Patricia B. Campbell**, Campbell-Kibler Associates, Inc

**Yolanda S. George**, AAAS

10:15 AM – 10:30 AM

## BREAK

10:30 AM – NOON

## BioQUEST CURRICULUM CONSORTIUM

**John R. Jungck**, Mead Chair of the Sciences & Professor of Biology Beloit College, Beloit, WI

**Catherine Dinitra White**, Assistant Professor of Biology North Carolina Agricultural and Technical State University

NOON–1:00PM

## LUNCH & NETWORKING

*Conference Theater, Lagoon Level*

1:00 PM – 2:00PM

## PEER-LED TEAM LEARNING (PLTL)

**Pratibha Varma-Nelson**, NSF, Program Director, Division of Undergraduate Education (DUE) & Professor of Chemistry, Northeastern Illinois University

*Conference Theater, Lagoon Level*

2:00 PM – 3:00PM

## comPADRE – DIGITAL RESOURCES FOR PHYSICS AND ASTRONOMY EDUCATION

**Bruce A. Mason**, Associate Professor, Physics and Astronomy, University of Oklahoma

3:00 PM

## CLOSING REMARKS

**Camille A. McKayle**, Program Director, NSF HRD & University of the Virgin Islands (UVI)

1:00PM–7:00PM

## EXHIBITORS SET-UP

*Independence Ballroom A, McPherson Square, Franklin Square, Independence Level*

3:30PM–5:00PM

## FACULTY & HBCU-UP PROGRAM POSTERS SET-UP

*Independence B&C, Independence Level*

4:00PM–5:00PM

## PACKARD HBCU SCHOLARS SESSION AIDES ORIENTATION

*Farragut Square, Independence Level*

5:00PM–6:00PM

## JUDGES & MODERATORS ORIENTATION

*Conference Theater, Lagoon Level*

## EXHIBITORS ORIENTATION

*Lafayette Square, Independence Level*

6:00PM–7:00PM

## FACULTY & HBCU-UP PROGRAM POSTER SESSION

*Independence B&C, Independence Level*

# Agenda

7:00PM–9:30PM

## OPENING PLENARY SESSION & DINNER

*Independence Ballroom, Independence Level*

GREETINGS FROM CONFERENCE CO-CHAIRS

**Larry Mattix**, Associate Dean, School of Science and Technology, Norfolk State University

**Sadanand Srivastava**, Chair & Professor of Computer Science, Bowie State University

CONFERENCE OVERVIEW & MESSAGE TO STUDENTS

**Camille A. McKayle**, **Marilyn J. Suiter**, and **Jessie A. DeAro**, Program Directors, NSF HRD

INTRODUCTION OF SPEAKER

**Yolanda S. George**, AAAS EHR, Deputy Director

SPEAKER

**Warren Washington**, Senior Scientist & Head, Climate Change Research Section, National Center for Atmospheric Research (NCAR)

REVIEW OF CONFERENCE LOGISTICS

**Lenell Allen**, AAAS, Senior Program Manager

WELCOME AND GREETINGS

**Victor A. Santiago**, Acting Director, NSF HRD

SPEAKERS

**Wanda E. Ward**, Deputy Assistant Director, NSF HRD

**Carolyn W. Meyers**, President, Norfolk State University

**Eddie Bernice Johnson**, U.S. Congress, Texas (invited)

9:45AM–11:45AM

## POSTER PRESENTATIONS 1

BIOLOGY, CHEMISTRY & CHEMICAL SCIENCES, COMPUTER SCIENCES & MGMT. INFORMATION SYSTEM, ECOLOGY ENVIRONMENTAL & EARTH SCIENCES, PHYSICAL & MATHEMATICAL SCIENCES, TECHNOLOGY & ENGINEERING

*Independence B&C, Independence Level*

9:45AM–11:45AM

## ORAL PRESENTATIONS 1

BIOLOGY – SESSION 1

*Pacifica A, Lagoon Level*

CHEMISTRY & CHEMICAL SCIENCES – SESSION 2

*Pacifica B, Lagoon Level*

COMPUTER SCIENCES & MGMT. INFORMATION SCIENCES – SESSION 3

*Independence D*

PHYSICAL & MATHEMATICAL SCIENCES – SESSION 4

*Independence E, Independence Level*

TECHNOLOGY & ENGINEERING – SESSION 5

*Wilson, Lagoon Level*

9:45AM–11:45AM

## CONCURRENT STUDENT OR FACULTY SESSIONS

**A1: GRADUATE SCHOOL FUNDING & UNDERGRADUATE RESEARCH OPPORTUNITIES**

**Sandy Thomas**, Executive Director, IGERT National Recruitment Program Institute for Broadening Participation

*Lafayette, Independence Level*

## Friday, October 5, 2007

7:00 AM–5:00PM

## REGISTRATION

*Independence Foyer, Independence Level*

7:00AM–7:45AM

## ORAL PRESENTATIONS 1 (SET-UP)

*Pacifica A&B, Independence D&E, Wilson*

## POSTER PRESENTATIONS 1 (SET-UP)

*Independence B&C, Independence Level*

## JUDGES ORIENTATION/SIGN-IN

*Conference Theater, Lagoon Level*

7:45AM–9:30AM

## NETWORKING BREAKFAST & PLENARY SESSION

*Independence Ballroom, Independence Level*

**The Role of HBCUs in Broadening Participation In the Nation's STEM Workforce**

MODERATOR

**Shirley M. Malcom**, Director, AAAS EHR

## **A2: WORKING WITH ADVISORS & MENTORS**

**Shireen K. Lewis, Ph.D.**, Executive Director,  
EduSeed and Sister Mentors, Washington DC  
*Farragut Square, Independence Level*

NOON–1:00PM

### **LUNCH**

*Independence Ballroom, Independence Level*

NOON–3:00PM

### **EXHIBITS OPEN**

*Independence I, H, G, F, Independence Level*

2:00PM–3:00PM

### **PACKARD SCHOLARS POSTER PRESENTATIONS 1**

*Independence B&C, Independence Level*

3:00PM–3:30PM

### **ORAL PRESENTATIONS 2 (SET-UP)**

*Pacifica A&B, Independence D&E, Wilson*

### **POSTER PRESENTATIONS 2 (SET-UP)**

*Independence B&C, Independence Level*

### **JUDGES ORIENTATION/SIGN-IN**

*Conference Theater, Lagoon Level*

3:30PM–5:30PM

### **POSTER PRESENTATIONS 2**

BIOLOGY, CHEMISTRY & CHEMICAL SCIENCES,  
COMPUTER SCIENCES & MGMT. INFORMATION  
SCIENCES, PHYSICAL & MATHEMATICAL SCIENCES,  
TECHNOLOGY & ENGINEERING

*Independence B&C, Independence Level*

3:30PM–5:30PM

### **ORAL PRESENTATIONS 2**

BIOLOGY – SESSION 6

*Pacifica A, Lagoon Level*

CHEMISTRY & CHEMICAL SCIENCES – SESSION 7

*Pacifica B, Lagoon Level*

COMPUTER SCIENCES & MGMT. INFORMATION  
SCIENCES – SESSION 8

*Independence D*

ECOLOGY, ENVIRONMENTAL & EARTH  
SCIENCES – SESSION 9

*Independence E, Independence Level*

TECHNOLOGY & ENGINEERING – SESSION 10

*Wilson, Lagoon Level*

3:30PM–5:30PM

### **CONCURRENT STUDENT SESSIONS SERIES B & PACKARD HBCU SCHOLARS ORAL PRESENTATIONS**

**B1: WHAT CAN I DO WITH A SCIENCE DEGREE?**

**Emil Thomas Chuck**, Health Professions Advisor,  
Term Assistant Professor of Biology, and Interim  
Coordinator for the Undergraduate-Faculty  
Research Apprenticeship Program, George Mason  
University, Fairfax VA

*Farragut Square, Independence Level*

**B2: THE ABCs OF GRADUATE PROGRAMS: HOW TO  
GET IN, HOW TO GET THROUGH**

*Lafayette, Independence Level*

5:00PM–6:00PM

### **PACKARD HBCU SCHOLARS ORAL PRESENTATIONS 1**

*Wilson, Lagoon Level*

5:30PM–8:30PM

### **EXHIBITS OPEN & RECEPTION**

*Independence Ballroom A, McPherson Square,  
Franklin Square, Independence Level*

8:45PM–10:00PM

### **TALENT SHOWCASE AUDITIONS (STUDENTS, FACULTY AND STAFF)**

*Independence Ballroom, Independence Level*

Saturday, October 6, 2007

7:00AM–5:00PM

### **REGISTRATION**

*Independence Foyer, Independence Level*

7:00AM–7:45AM

### **ORAL PRESENTATIONS 3 (SET-UP)**

*Pacifica A&B, Independence D&E, Wilson*

# Agenda

	<b>POSTER PRESENTATIONS 3 (SET-UP)</b> <i>Independence B&amp; C, Independence Level</i>	9:45AM–11:45AM	<b>CONCURRENT STUDENT SESSIONS SERIES C</b>
	<b>JUDGES ORIENTATION/SIGN-IN</b> <i>Breakfast served in Conference Theater, Lagoon Level</i>		<b>C1: LEARNING STRATEGIES FOR ACADEMIC SUCCESS</b> <b>Sarah Baird</b> , Assistant Director, Center for Academic Success, Louisiana State University in Baton Rouge <i>Lafayette, Independence Level</i>
7:00AM–7:45AM	<b>NETWORKING BREAKFAST</b> <i>Independence Ballroom, Independence Level</i>		<b>C2 : WHAT CAN I DO WITH A SCIENCE DEGREE?</b> <b>Irene V. Hulede</b> , Manager, Student Programs, American Society for Microbiology <i>Farragut Square, Independence Level</i>
7:45AM–9:30AM	<b>PLENARY DISCUSSION</b> <b>LIFESTYLES OF PHD SCIENTISTS AND ENGINEERS</b> <i>Independence Ballroom, Independence Level</i> <b>Ashanti J. Pyrtle</b> , Assistant Professor, Chemical Oceanography, University of South Florida <b>Gregory Triplett</b> , Assistant Professor, Electrical and Computer Engineering, University of Missouri at Columbia <b>Michael Smith</b> , Program Manager, NSF HBCU Research Alliance for Graduate Studies in Computer Sciences, University of California, Berkeley		<b>C3: GRADUATE SCHOOL FUNDING &amp; UNDERGRADUATE RESEARCH OPPORTUNITIES</b> <b>Sandy Thomas</b> , Executive Director, IGERT National Recruitment Program Institute for Broadening Participation <i>Independence D&amp; E Independence Level</i>
9:00AM–NOON	<b>EXHIBITS OPEN</b> <i>Lafayette/Farragut Square, Independence Level (190)</i>	11:00AM–NOON	<b>PACKARD HBCU SCHOLARS POSTER PRESENTATIONS</b> <i>Independence B&amp;C, Independence Level</i>
9:45AM–11:00AM	<b>POSTER PRESENTATIONS 3</b> BIOLOGY, CHEMISTRY, COMPUTER SCIENCES & MGMT. INFORMATION SCIENCES, PHYSICAL SCIENCES & MATHEMATICS, TECHNOLOGY & ENGINEERING, <i>Independence B&amp; C, Independence Level)</i>	NOON–12:15PM	<b>LUNCH, ALIENS OF THE DEEP VIDEO &amp; PLENARY DISCUSSION</b> <i>Independence Ballroom, Independence Level</i> MODERATOR <b>Barbara A. Laval</b> , National Science Education Institute for Excellence in Astrobiology and Astrophysics DISCUSSION WITH SCIENTISTS FROM ALIEN OF THE DEEP VIDEO <b>Dijanna Figueroa</b> , PhD Student, Marine Animal Physiologist University of California, Santa Barbara <b>Kevin Hand</b> , Planetary Scientist/Astrobiologist NASA Jet Propulsion Laboratory
9:45AM–11:45AM	<b>ORAL PRESENTATIONS 3</b> SOCIAL & BEHAVIORAL SCIENCES – SESSION 11 <i>Wilson, Lagoon Level</i>	1:00PM–2:00PM	<b>EXHIBITS ENDS–REMOVE DISPLAYS</b>
		2:30PM–4:30PM	<b>JUDGES MEETING (DETERMINING AWARDEES)</b> <i>Conference Theater, Lagoon Level</i>



2:30PM–4:30PM

## CONCURRENT STUDENT & FACULTY SESSIONS SERIES D

### **D1: NETWORKING: GETTING INVOLVED & BEING KNOWN MATTERS (STUDENT SESSION)**

**Melissa C. Green, Ph.D.**, Director, Division of  
Science and Technology, United Negro College  
Fund Special Programs Corporation, Fairfax VA

*Pacifica A&B, Lagoon Level*

### **D2: LEARNING STRATEGIES FOR ACADEMIC SUCCESS (STUDENT SESSION)**

**Sarah Baird**, Assistant Director, Center for  
Academic Success, Louisiana State University in  
Baton Rouge Lafayette, Independence Level

2:30PM–3:30PM

### **D3: SCIENCE ENGAGEMENT FOR NEW CIVIC ENGAGEMENTS AND RESPONSIBILITIES (SENCER) – COURSE RESOURCES (FACULTY SESSION)**

**Terry R. McGuire**, Vice Chair, Dept. of Genetics,  
Rutgers University

*Farragut Square, Independence Level*

**William E. Bennett**, Senior Scholar, National  
Center for Science & Civic Engagement

3:30PM–4:30PM

### **D4: BROADENING PARTICIPATION IN COMPUTING WITH THE K-GRAY ENGINEERING PATHWAY DIGITAL LIBRARY (FACULTY SESSION)**

**Michael Smith**, Program Manager, NSF HBCU  
Research Alliance for Graduate Studies in  
Computer Sciences, University of California,  
Berkeley

*Independence D&E, Independence Level*

3:00PM–4:30PM

## PACKARD HBCU SCHOLARS ORAL PRESENTATIONS 2

*Wilson, Lagoon Level*

4:30PM–6:30PM

## FREE TIME

6:30PM–9:30PM

## PLENARY SESSION & AWARDS BANQUET

*Independence Ballroom, Independence Level*

MODERATOR

**Camille McKayle**, Program Director, NSF HRD &  
University of the Virgin Islands (UVI)

INTRODUCTION OF PACKARD HBCU SCHOLARS

**Shirley M. Malcom**, AAAS EHR, Director

PLENARY SPEAKER

**Georgia M. Dunston**, Professor, Department of  
Microbiology & Founding Director National Human  
Genome Center, (NHGC) Howard University College  
of Medicine

*Genome Variation in Human Identity & Health  
Disparities*

POSTER AND ORAL PRESENTATIONS AWARDS

**Teresa Edwards**, Associate Professor,  
Mathematics, Georgia Gwinnett College

**Caesar R. Jackson**, Dean, College of Science and  
Technology, North Carolina Central University

**Nancy Greer-Williams**, Dean, Liberal Arts/Social  
Sciences, Arkansas Baptist College

**Joe Omojola**, Professor of Mathematics and  
Physics, Southern University at New Orleans

**Adriane Ludwick**, Professor, Department of  
Chemistry, College of Architecture, Environmental  
& Natural Sciences, Tuskegee University

CLOSING REMARKS

**Camille A. McKayle & Marilyn J. Suiter**, NSF HRD,  
Program Directors

9:30PM–11:00PM

## TALENT SHOWCASE

*Independence Ballroom, Independence Level*

11:00PM–MIDNIGHT

## SOCIAL

*Independence Ballroom, Independence Level*

## Sunday, October 7, 2006

8:00AM –10:00AM

## BRUNCH (Special Registration Required)

*Independence Ballroom, Independence Level*

10:00AM

## CONFERENCE ENDS

# Biographies



## **Lenell Allen**

Lenell Allen is Senior Program Manager in the American Association for the Advancement of Science's (AAAS) Directorate for Education and Human Resources Programs, where she conducts research on science, technology,

engineering, and mathematics (STEM) education and policy issues, with special emphasis on the representation of women and underrepresented minorities in STEM disciplines. Before joining AAAS, Allen was an Administrative Faculty and Program Director at North Central University in Minneapolis, Minnesota. She was instrumental in establishing the Adult Degree Completion Program, including the development of curriculum, program design, and evaluation for the Business and Organizational Leadership degree.

Allen previously served as Director of Engineering Student Programs at Prairie View A&M University, Program Director of the Missouri Alliance for Graduate Education and the Professoriate (MAGEP) at the University of Missouri–Columbia campus (MU), and Assistant Director for the Women and Minority Engineering Programs at the University of Missouri–Rolla (UMR) campus.

Allen's teaching experience includes an engineering orientation course for first-year and transfer students, as well as a graduate course in the history of higher education. Her research focuses on access and equity in higher education, student learning and achievement, and African-American women experiences in engineering. She has served on review panels for NSF and the United Negro College Fund (UNCF) Special Programs Corporation Sponsored by the National Aeronautical Space Administration (NASA).

Allen began her career in engineering with Procter and Gamble as a Distribution Manager at its manufacturing plant in St. Louis, Missouri. She earned her Bachelor of Science Degree in Mechanical Engineering from the University of Kansas in 1984. Allen received her Master of Arts Degree in Higher and Adult Education, and her Doctor of Philosophy in Educational Leadership and Policy Analysis with a concentration in engineering education from the University of Missouri–Columbia in 1994 and 2001, respectively.



## **Sarah Baird**

Sarah Baird is the Assistant Director of the Center for Academic Success at Louisiana State University in Baton Rouge, Louisiana. She received a B.A. degree from Luther College in Decorah, Iowa and a Masters in Counseling and Human Development from

the University of Iowa, Iowa City, Iowa.

Baird began her career by applying the study of psychology and counseling to the field of Health Education at the University of Arizona in Tucson. During her tenure in Arizona she developed programs for sexual assault prevention and alcohol and other drug education which culminated in the opening of the Oasis Advocacy Center.

A move to Louisiana offered Baird the opportunity to transfer the strategies used for inspiring student health and safety to student learning and the application of cognitive science. She has served at the Center for Academic Success at LSU for 11 years, including one sabbatical year as Director of the Spark Center for Learning and Writing at Judson College near Chicago, IL. She has received national recognition for the development of a unique Resident Assistant Training Program and is a lead developer of an award-winning college learning website. Baird specializes in translating cognitive science principles such as metacognition and cognitive restructuring to practical and attainable learning experiences for students and application of these principles to instructional practices for faculty.

Baird lives in Baton Rouge, LA with her husband, David (faculty member in Architecture) and energetic sons Bo (8) and Sky (5).



## **William E. Bennett**

William E. Bennett is a senior scholar with the National Center for Science & Civic Engagement. Prior to retirement, Bennett served as senior science advisor to the Secretary, U.S. Department of Health and Human Services. Recently, he chaired the

Education and Credentials Committee of the US Congressional Black Caucus Taskforce on the US/Cuban Medical Scholarship Initiative, including co-chairing a site visit to Cuba and authoring the taskforce's report on Cuban Medical Education. Currently, he sits on boards for both CDC and NIH funded projects.

Bennett has held appointments as medical school faculty, bench scientist and scientist administrator in the U.S.

Department of Defense and U.S. Department of Health and Human Services. He has published, lectured, and consulted in the areas of cellular immunology, cell differentiation, medical education, and disease prevention. He has been honored by numerous national and international organizations, medical colleges, and federal agencies. In 2000, he was the first recipient of the award named in his honor, The Annual William E. Bennett Award, at the Morehouse School of Medicine. Bennett received his PhD from the University of Pennsylvania and was a postdoctoral fellow at Rockefeller University. He holds two honorary doctorates.



### Patricia B. Campbell

Patricia B. Campbell, President of Campbell-Kibler Associates, Inc has been involved in educational research and evaluation with a focus on formal and informal science, technology, engineering and mathematics (STEM) education and issues of race/ethnicity, gender and disability since the mid 1970's. She received a B.S from LeMoyne College in mathematics, a MS, from Syracuse University in instructional technology, and a PhD from Syracuse University in teacher education. Campbell, formerly a professor of research, measurement and statistics at Georgia State University, has authored more than 100 publications including co-authoring *Engagement, Capacity and Continuity: A Trilogy for Student Success* and *Upping the Numbers: Using Research-Based Decision Making to Increase Diversity in the Quantitative Sciences* with Eric Jolly and Lesley Perlman. She also is a co-author, with Beatriz Chu Clewell, of *What Do We Know?: Seeking Effective Math and Science Education and Creating Good Schools in Poor Neighborhoods: Defying Demographics, Achieving Success*.



### Emil Chuck

Emil Chuck joined George Mason University as Health Professions Advisor and Term Assistant Professor of Microbiology and Molecular Biology in July 2006. Chuck received his B.S. in biomedical engineering from Duke, his PhD in cell biology from Case Western, and did his postdoctoral training at Metrohealth Medical Center, Duke University Medical Center, and Mt. Sinai Medical Center. His postdoctoral training was funded

by fellowships from the Heart Rhythm Society, the National Institutes of Health, and the Novartis Foundation.

He is a member of the National Association of Advisors in the Health Professions, Sigma Xi, and National Postdoctoral Association. Chuck is an advocate in scientific education and workforce development.



### Jessie DeAro

Jessie DeAro is currently Program Director for the ADVANCE Program at the National Science Foundation (NSF), a program to increase the representation and advancement of women in academic science and engineering careers. She joined NSF in 2003 to work with the Historically Black Colleges and Universities-Undergraduate Program (HBCU-UP) to enhance the science and engineering education programs at HBCUs. She started her career in the Federal government at the U.S. Department of Education (DoED) as a Presidential Management Fellow (PMF) after receiving her doctorate in physical chemistry from the University of California at Santa Barbara. At DoED she worked within the Office of Postsecondary Education on capacity building programs for Minority-Serving Institutions to enhance their institutional infrastructure, financial management, and education programs. She originally managed the newly established Developing Hispanic-Serving Institutions program and served as the special assistant to the Director of Institutional Development and Undergraduate Education Services (IDUES). Before joining NSF she worked with the Fund for the Improvement of Postsecondary Education (FIPSE) as a science program officer supporting innovation projects with the potential to significantly improve postsecondary education outcomes.



### Teresa D. Edwards

Most of Teresa D. Edwards's academic experience has been at Spelman College in Atlanta, Georgia. From 1986 to 2005, she served as the Chair of the Mathematics Department and on many college committees. Edwards taught a wide range of mathematics courses and also conducted a hands-on workshop for secondary school teachers on mathematical applications through the Spelman College Center for Scientific Applications of Mathematics.

# Biographies

While on loan from Spelman College to Bennett College during academic years 2003–2004 and 2004–2005, Edwards served as Chair for the Division of Natural and Behavioral Sciences and Mathematics and as the Interim Chair of the Department of Mathematics and Computer Sciences. She was instrumental in helping the college to secure several grant awards. She also conducted a hands-on workshop for secondary school teachers on discrete mathematics through Bennett College's Project Soaring High.

After leaving Bennett College in June 2005, Edwards joined the Quality Education for Minorities (QEM) Network and worked on mathematics, science, and engineering-related projects, particularly those related to mathematics curriculum and proposal development and implementation. She spent the academic year 2006–2007 as a Visiting Associate Professor of Mathematics at the University of the Virgin Islands (UVI). In the fall of 2007, Edwards joined the faculty at the new Georgia Gwinnett College near Atlanta, Georgia.

Edwards' professional involvement includes serving on AAAS's Committee on Opportunities in Science (COOS); the Editorial Board of the College Mathematics Journal (CMJ); the Executive Board of the Association for Women in Mathematics (AWM); and several Mathematical Association of America (MAA) committees.

Edwards has been honored by many institutions for her work in the field and holds a Doctorate Degree in Industrial and Systems Engineering and a Master of Science in Operations Research from the Georgia Institute of Technology. She also holds a Bachelor of Arts in Mathematics from Spelman College.



## Georgia Dunston

Georgia Dunston is a Professor in the College of Medicine at Howard University. Dunston, who has been with the University since 1972, is also the former Chair of the Department of Microbiology. Her research interests are the biomedical significance of genetic variation in African-Americans and increasing minority participation in human genetic research. These interests led to the establishment of the Human Immunogenetics Laboratory at Howard in 1985, where she has served as founder and director of this core component of the National Institutes of Health (NIH) funded Research Centers in Minority Institutions Interdisciplinary Program.

Dunston has been instrumental in increasing knowledge on human leukocyte antigen (HLA) polymorphisms in African-

Americans. Her research examines the impact of population differences in HLA variation on donor/recipient matching in clinical transplantation and gene-based differences in the immune response to organ transplants. Dunston's research on the biomedical significance of human genome polymorphisms has been the vanguard of current efforts at Howard University to build national and international research collaborations focusing on genome-wide studies of diseases common in both African-Americans and people in the African Diaspora. This research has provided the scientific foundation for formation of the National Human Genome Center (NHGC) at Howard University with Dunston as the founding director.

In addition to her research and role as an educator, Dunston is a frequent speaker at universities and conferences throughout the U.S. and abroad, has several publications on HLA variation and disease associations in African-Americans, and has served on several national scientific councils and committees. Dunston earned a bachelor's degree in biology from Norfolk State University, a master's degree in biology from Tuskegee University, and a PhD in human genetics from the University of Michigan. She also conducted postdoctoral work in tumor immunology at NIH in the National Cancer Institute.



## Dijanna Figueroa

Dijanna Figueroa is a PhD candidate in the Interdisciplinary Program in Marine Science at the University of California Santa Barbara. She obtained her B.S. in Marine Biology from UCLA. During her last year at UCLA she interned at the Monterey Bay

Aquarium Research Institute and was introduced to the complex questions associated with life in the deep sea. Her current work focuses on the physiology and ecology of organisms adapted to some of the most extreme environments on earth.

Over the past few years she has had the opportunity to conduct research at various deep sea hydrothermal vents around the world. Since she began working in deep sea environments she has spent over 200 days at sea and participated in 12 manned submersible dives. Her work has been featured on NPR, Ebony Magazine, and various scientific publications.

While not at sea or in the lab she enjoys spending time with family, reading, and ballroom dancing. She is also very committed to the promotion of science education and access to all members of society regardless of class and ethnicity.

She credits her mom and dad, Dion and Joe Smotherman, for encouraging her to pursue her dreams.



## **Yolanda S. George**

Yolanda Scott George is Deputy Director and Program Director, Education and Human Resources Programs, American Association for the Advancement of Science (AAAS). Her duties and responsibilities include planning, development,

management, implementation, and evaluation of multi-year science, mathematics, and technology (SMT) education and educational research projects. She has served as Director of Development, Association of Science-Technology Centers (ASTC), Washington, DC; Director, Professional Development Program, University of California, Berkeley, CA, a pre-college academic enrichment, university retention, and pre-graduate school program in SMT for minorities and women, and as a research biologist at Lawrence Livermore Laboratory, Livermore, California involved in cell cycle studies using flow cytometer and cell sorters.

George conducts evaluations, project and program reviews, and evaluation workshops for both the National Institutes of Health and National Science Foundation, as well as reviews SMT proposals for private foundation and public agencies, including the Sloan Foundation, the Carnegie Corporation of New York, the Ford Foundation, and the European Commission. She develops and coordinates conferences and workshops related to recruitment and retention of minorities, women, and persons with disabilities in SMT. She works with UNIFEM, UNESCO, and non-governmental organizations on gender, science, and technology initiatives related to college and university recruitment and retention, and women leadership in SMT.

Over the last 25 years she has raised over \$70 million for a variety of SMT education initiatives for colleges and universities, associations, and community-based groups. She currently serves as principal investigator (PI) or co-PI on National Science Foundation (NSF) grants related to developing evaluation capacity of PIs, project directors and evaluators for the Alliance for Graduate Education and the Professoriate (AGEP); development of a National Science Education Digital Library (NSDL) Biological Sciences Pathways for biological sciences educators in undergraduate, graduate and professional schools; Women's International Scientific Cooperation Program (WISC); Historically Black Colleges and Universities-Undergraduate

Programs (HBCU-UP); and Course, Curriculum, and Laboratory Improvement (CCLI) for undergraduates. She serves on the board of the International Women in Science and Engineering Network (INWES); American Institute of Biological Sciences (AIBS) Education Committee, Award Advisory Committee; Maria Mitchell Women in Science Award, McNeill/Lehrer Productions Online Science Reports and Resources Advisory Committee, Great Science for Girls: Extension Services for Gender Equity in Science Advisory Committee, Academy for Educational Development, and the South Dakota Biomedical Research Network Advisory Committee. George has authored or co-authored over 50 papers, pamphlets, and hands-on science manuals. She received her B.S. and M.S. from Xavier University of Louisiana and Atlanta University in Georgia, respectively.



## **Melissa Green**

Melissa Green is Director of the Division of Science and Technology at United Negro College Fund Special Program Corporation (UNCFSP) providing expert leadership in areas of effective project management, strategic development and capacity

building for minority institutions. A former research scientist, she has coordinated workshops for underrepresented STEM students.

Green received her B.S. degree in Chemistry from Claflin College and her Ph.D. in Biochemistry from the Indiana University School of Medicine. Prior to coming to UNCFSP, she acquired expertise in cancer and reproductive biology through her appointments at Eli Lilly & Company, Kansas State University and Morehouse School of Medicine.



## **Nancy Greer-Williams**

Nancy Greer-Williams' most recent title is Dean and Professor of the School of Liberal Arts and Social Sciences and Title III Coordinator. In addition to teaching and motivating students on the advantages of a higher education degrees, Greer-Williams

is most passionate regarding education and health disparities research. She has launched several research initiatives on the plight of minority students in higher education. Specifically these include the high attrition rate of African-American, Hispanic/Latino, and American Indian doctoral students, the cultural and institutional barriers which prevent access to

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minority college students, the connection between low social economic status and chronic disease in African American college students; cultural and institutional barriers in organizations which impact minority leaders, and the crisis regarding diversity in organizations.

Greer-Williams is pursuing a Masters' of Public Health emphasis in Epidemiology (2009) at the University of Arkansas for Medical Sciences (UAMS). She earned a Ph.D. in Educational Leadership emphasis in Higher Education Administration (2004) from Western Michigan University, a Master's degree in Organizational Communication (2001) from Western Michigan University, and a Bachelor of Science in Broadcast Communication (1997) from Western Michigan University.

She has held several leadership positions in program design and implementation. At Howard University, she was the Program Director for the Howard University Science Engineering and Mathematics (HUSEM) program, a program sponsored by the National Science Foundation. At Western Michigan University, Greer-Williams served as the Doctoral Associate for the graduate school in the Office of Recruitment and Retention. In this position, she helped mentor, counsel, and plan programs for retention of master's and doctoral students. A component of her doctoral internship included coordinating the adoption of the Howard University Preparing Future Faculty (PFF) program at Western Michigan University.



## **Kevin Hand**

Kevin Hand is a planetary scientist/astrobiologist with NASA's Jet Propulsion Laboratory in Pasadena, CA. His research focuses on the origin, evolution, and distribution of life in the solar system. Specifically, his work involves

both theoretical and experimental research on the habitability of Europa's large sub-surface ocean (Europa is Jupiter's second large moon). His work has brought him to the Dry Valleys of Antarctica, the depths of the Earth's oceans, and to the canyons of Namibia. He is also the founder of Cosmos Education, an international non-profit organization dedicated to grass-roots science education in developing regions of the world. He was born and raised in Manchester, Vermont. He earned his PhD in geology at Stanford, and bachelor's degrees in physics and psychology from Dartmouth College. He also holds a masters in mechanical engineering/robotics from Stanford University.



## **Irene Hulede**

Irene Hulede serves as Manager of Student Programs for The American Society for Microbiology (ASM), Education Department. She manages the development and implementation of educational products and programs

for k-12 students, undergraduate and graduate students and post-doctoral scholars in the microbiological sciences and/or biological sciences. Specifically, Hulede manages ASM fellowship programs, the Annual Biomedical Research Conference for Minority Students (ABRCMS) and the ASM Kadner Institute. The fellowships, which support approximately 80 fellows annually, are sustained through a \$10 million ASM Fellowship Fund and partnerships with the Centers for Disease Control in Atlanta and US colleges and universities. The ABRCMS serves nearly 3000 students, faculty, program directors, speakers and exhibitors and is sustained by a 5-year grant from the National Institute of General Medical Sciences, and the ASM Kadner Institute serves nearly 50 students and post-doctoral scientists, speakers and mentors and is supported by ASM, National Institute of Allergy and Infectious Diseases and Burroughs Welcome Fund.



## **Eddie Bernice Johnson**

Congresswoman Eddie Bernice Johnson represents Texas's 30th Congressional District, which is entirely within Dallas County and encompasses a large portion of the city of Dallas as well as the entire cities of Desoto, Lancaster, Wilmer, Hutchins,

and Balch Springs. Portions of the cities Cedar Hill, Duncanville, Glenn Heights, Ferris, and Ovilla are also in the district. The Dallas portion of the district is home to the downtown central business district and arts district, as well as the neighborhoods of Fair Park, Cadillac Heights, the Cedars, Uptown, Oak Lawn, Bachman Lake, Urban Park, Pleasant Grove, Joppa, South Oak Cliff, Deep Ellum, Munger Place, Swiss Avenue, Lower Greenville, Forest Hills, and West Dallas.

Congresswoman Johnson is widely recognized as one of the most effective legislators in Congress. She is credited with originally authoring and co-authoring more than 120 bills that were passed by the House and Senate and signed into law by the President.

In 2007, Congresswoman Johnson has been appointed by House Transportation and Infrastructure Committee Chairman James L. Oberstar (D-MN) to serve as Chairwoman of the Subcommittee on Water Resources and Environment during the 110th Congress. Congresswoman Johnson has been a member of the House Transportation Committee since being sworn into office in January 1993. The Subcommittee has jurisdiction over water conservation, pollution control, infrastructure, and hazardous waste cleanup. Among other laws, this Subcommittee is also responsible for reauthorizing the Clean Water Act. Congresswoman Johnson is also a member of the Aviation and Railroad Subcommittees.

She is currently a Senior Democratic deputy whip, chairwoman for the Texas Democratic Delegation, chair for the House Metro Congestion Coalition, co-chair for the North America's Supercorridor Caucus and co-chair for the TEX-21 Congressional Caucus, which is a forum to address Texas' transportation needs through the reauthorization of TEX-21. In addition, Congresswoman Johnson served as chair of the Congressional Black Caucus during the 107th Congress.

From 2000-2002, Congresswoman Johnson was the Ranking member of the Science Research subcommittee. She remains a senior member of that subcommittee in addition to serving on the Oversight subcommittee. Johnson, who ranks third in seniority on the Science Committee, serves as a leader in drafting and supporting legislation dealing with scientific research, development, and policy.

Since coming to Congress, Congresswoman Johnson has earned the reputation of being a stateswoman on U.S. foreign policy and worked to improve human rights around the globe where her acclaimed initiative "Women for World Peace" has been nationally and internationally recognized.

Congresswoman Johnson studied nursing at St. Mary's College at the University of Notre Dame and earned a bachelor's degree in nursing from Texas Christian University in 1967. She received a master's degree in public administration from Southern Methodist University in 1976 and subsequently served as the chief psychiatric nurse at the Veterans Administration Hospital in Dallas. Congresswoman Johnson was elected to the Texas House of Representatives in 1972 and became the first woman in Texas history to lead a major Texas House committee, the Labor Committee.

Congresswoman Johnson has a long-standing reputation for providing excellent constituent services. Her district offices in downtown Dallas specialize in working with all federal

departments and agencies to assist citizens in solving a wide range of individual problems.

As an advocate for workers, children, and families, she was recognized and appointed by President Jimmy Carter to serve as regional director of the Department of Health, Education, and Welfare in 1977. In 1986, she was elected a Texas state senator, becoming the first African American female from the Dallas area to hold this office since Reconstruction. She is now in her eighth term representing the citizens of the Thirtieth Congressional District of Texas.

Congresswoman Johnson counts among her greatest accomplishments her son Kirk and three grandsons, Kirk Jr., David, and James.



## Caesar R. Jackson

Caesar R. Jackson is presently the Dean of the College of Science and Technology at North Carolina Central University (NCCU). He joined NCCU in August 2005 after being employed at North Carolina Agricultural and Technical State University (NCA&T) for 13 years. At NCA&T, Jackson was Interim Dean of the College of Arts and Sciences from 2002 to 2005, Associate Dean for Research and Graduate Programs in the College from 1998 to 2000, Professor of Physics and Chairperson of the Department of Physics from 1994 to 1998, and Assistant Professor from 1992 to 1994. Before NCA&T, Jackson was a Staff Engineer for the IBM Corporation, where he was employed from 1977 to 1992. Jackson earned a Bachelor of Engineering Technology in Electrical Engineering from Florida Agricultural and Mechanical University in 1977, a Master of Engineering in Electrical Engineering from the University of Florida in 1980, and a Doctor of Philosophy in Physics from North Carolina State University in 1992. He has been engaged in nuclear physics research at Triangle Universities Nuclear Laboratory in Durham, North Carolina, and at Thomas Jefferson National Laboratory in Newport News, Virginia. He continues to be involved in scholarly activities at NCCU, focusing on science education research and on issues associated with increasing the number of minorities pursuing degrees and careers in science, technology, engineering, and mathematics.

# Biographies



## John R. Jungck

John R. Jungck is the Mead Chair of the Sciences, Professor of Biology, and Chair of the Science Division at Beloit College. He specializes in mathematical molecular evolution and bioinformatics, history and philosophy of biology, and science education reform. In 1986, he co-founded the BioQUEST Curriculum Consortium, a national consortium of college and university biology educators devoted to curricular reform across the nation. It promotes quantitative, open-ended problem solving, collaborative learning, peer review, research, and civic engagement/social responsibility. He teaches courses in Evolution, Genetics, Cellular and Developmental Biology, Bioinformatics, Mathematical Biology, Finite Mathematics, and the History and Philosophy of Biology as well as liberal arts courses team-taught with a poet such as East/West, Gödel, Escher, Bach, Two Cultures/Four Epochs, and Victorian Studies. He has held many editorial positions: Editor, *The BioQUEST Library*; Editor, *Bioscene: Journal of College Biology Teaching*; Editor, *American Biology Teacher*; Associate Editor, *Bulletin of Mathematical Biology*; *Book and Software Editor, BioScience*; Associate Editor, *Journal of Computers in College Mathematics and Science Teaching*; and the Editorial Boards of several journals: *Evolutionary Bioinformatics Online*, *Numeracy*, *BioSystems: Journal of Molecular, Cellular and Behavioral Origins and Evolution*, *American Journal of Undergraduate Research*, and *Cell Biology (Life Science) Education*.

He is the Chair of the National Academies of Science's U.S. National Committee of the International Union of Biological Sciences, on the Council of AAAS, a member of the Executive Committee of the International Union of Biological Sciences, Chair of the Education Committee of the Society for Mathematical Biology, Vice President of the Commission on Biological Education of the International Union of Biological Sciences, on the Governing Board of the National Numeracy Network, and Chair of the Awards Committee of the American Institute for Biological Sciences. He formerly served as President of the Association of College and University Biology Educators (ACUBE.org). He served on two National Research Council committees, the Board on Science Education and the Information Technology committee. He has received significant grant support from the Howard Hughes Medical Institute (HHMI), NSF, US Department of Education, Annenberg Fund/Corporation for Public Broadcasting, and numerous private foundations.

His awards include the 2004 AIBS Education Award, an honorary doctorate from the University of Minnesota, two EDUCOM awards for software and curricula, a National Science Teachers Association O'Haus Award for Outstanding Innovations in College Science Teaching, and Teacher of the Year at Beloit College.

He has traveled to over forty countries and presented professionally at many of them. He serves on boards in both New Zealand and Thailand. He is a Fulbright Scholar (Thailand), a Mina Shaughnessy Scholar, a Fellow of the National Institute of Science Education, and a Fellow of the American Association for the Advancement of Science.



## Barbara Laval

Barbara Laval has built a career managing and developing university and scientific programs at UCLA. Most recently, she managed the NASA-UCLA Center for Astrobiology in the Institute of Geophysics and Planetary Physics and was Director of the Education and Public Outreach programs (EPO) for the center. She was the liaison to the NASA Astrobiology Institute (NAI), and was elected to the NAI Executive Council and co-represented the eighteen lead team EPO Directors and Collaborators. In March 2002, under the direction of the then NASA Astrobiology Institute Director, Nobel Laureate, Dr. Baruch Blumberg, the NAI Minority Institution Research Sabbatical (MIRS) program was created. Laval had an integral role in the development of the program and served as a member of the MIRS team.

This past summer, Laval was accepted to the Harvard-Smithsonian Center for Astrophysics "Beyond the Solar System" Summer Leadership Institute. She was advisor to the UCLA AstroBiology Society and was University Affairs liaison for the Minority Institution Astrobiology Collaboratory (MIAC). Laval was selected a NASA science judge at the Afro-American, Academic, Cultural, Technological, and Science Olympics (ACT-SO) sponsored by NASA and the National Association for the Advancement of Colored People (NAACP) and was also selected as a NASA science judge for the Intel International Science and Engineering Fair. She was selected to participate in the NASA Astrobiology Institute's (NAI) Search for Extraterrestrial Intelligence (SETI) inaugural program – "Voyages through Time" their Astrobiology Summer Science Experience for Teachers (ASSET) at the SETI institute.



March 2002, Laval was the luncheon speaker at Tennessee State University's 24th annual University-Wide Research Symposium. In July 2002, she was a member of the UCLA Astrobiology team that participated in the Curso de Verano Astrobiología in Madrid Spain. Laval served as the Executive Vice President of the Administrator's and Supervisor's Association at UCLA and had a major role in designing the first ever UC Conference on Leadership and Management that included the then nine UC campuses and was Mistress of Ceremonies for the Conference. She was a UCLA campus wide mediator, member of UCLA's Women for Change, UCLA's Women Studies program and a member of the Friend of the United Nations.

Laval was a delegate to the United Nations 2001 World Conference on Racism, Racial Discrimination, Xenophobia and other Intolerances, held in Durban South Africa. After returning from South Africa, she organized a conference on the UCLA campus titled "Race Rave". Webster's definition of "rave" is to talk and write with enthusiasm. The Race Rave was a two-day conference, where people of all ages, ethnicities, and religions came together and discussed issues of concern that continue to exist in our society today (racism, sexism, and child welfare etc.).

For her community outreach and volunteer work, Laval received her first Congressional recognition August 10, 2002. That same day, as part of her Native American heritage, she participated in an official Native American naming ceremony where she received her official Cherokee name "Angel (Spirit) Wings." On August 17, 2005, she received her second Congressional recognition for her NASA-UCLA Education and Public Outreach work from Congressman Brad Sherman.



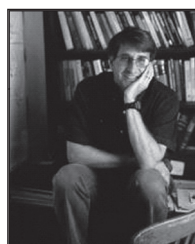
## Shireen Lewis

Shireen Lewis is the Executive Director of EduSeed and the Founder of EduSeed's SisterMentors program. She has over 20 years of experience mentoring women and girls. Her new book on Francophone West Africa and the Caribbean was published in 2006 and she writes a monthly column for The Hispanic Outlook in Higher Education Magazine. Lewis has a Ph.D. from Duke University, a J.D. from the University of Virginia, School of Law and a B.A. from Douglass College, Rutgers University. She is admitted to practice law in the State of New York and the District of Columbia.



## Adriane G. Ludwick

Adriane G. Ludwick is a Professor of Chemistry at Tuskegee University. She has managed the NSF HBCU-UP grants at Tuskegee University since 1999. Currently, she is on the Board of Trustees of the Alabama Academy of Science and a Councilor for the Auburn Section of the American Chemical Society. She was Chemistry Department Head at Tuskegee University from 1992 to 1999. Her degrees in chemistry are from Rutgers University (Douglass College) (BA) and the University of Illinois at Urbana/Champaign (MS and PhD). Her career has been entirely at Tuskegee, with summer interludes at Oak Ridge National Laboratory, the Lawrence Livermore Laboratory, Bell Laboratories in Murray Hill, New Jersey, and the Naval Air Development Center. Faculty fellowships from the National Institutes of Health and NSF (1978–1980) allowed study and research in polymer science at the University of Michigan. This led to her development of a course in polymer chemistry and to her involvement in material science research. Some of her current research centers on "green chemistry." The characterization and application of an anti-corrosion marine coating containing extracts from algae and herbs is underway in collaboration with Alexandria University in Egypt. A more extensive collaboration with Assiut University in Egypt involves the preparation of modified bagasse for use as an oil-absorbing material. Other recent work includes the modification of phenol/formaldehyde resins by the introduction of boron or halogen or various nanosilicates and the study of the aging mechanism of polyurethanes. This current research has been supported by individual grants as well as by grants obtained by teams of Tuskegee faculty members. Her teaching has ranged from general chemistry to organic chemistry to polymer chemistry and from freshman to PhD-level classes. Most recently, she has been developing a graduate-level polymer science course for engineers and chemists.



## Bruce A. Mason

Bruce A. Mason is an Associate Professor in the Homer L. Dodd Department of Physics and Astronomy at the University of Oklahoma. His research involves the theoretical study of the properties of electronic systems in semiconductors. This work uses extensive computer modeling of semiconductor

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structures to understand the electronic states of these systems, and their electron dynamics. Mason's work includes the study of parabolic quantum wells, hetero-junctions, metal-oxide-semiconductor structures and semiconductor quantum wires. Mason is interested in the electronic transport, optical, and infrared properties of these systems including the effects of magnetic fields and disorder. The techniques used in these calculations include self-consistent local density simulations, many-body Green function techniques, Monte Carlo simulations, and path integrals. Mason is also interested in the device applications of novel quantum systems for transistors and detectors. He received his PhD from the University of Maryland and his B.S. from Oberlin College. He is the NSF Principal Investigator for comPadre, Digital Resources for Physics and Astronomy Education. comPadre is a partnership of the American Association of Physics Teachers (AAPT), the American Astronomical Society (AAS), the American Institute of Physics/Society of Physics Students (AIP/SPS), and the American Physical Society (APS).



## **Shirley M. Malcom**

Shirley M. Malcom is Director, Education and Human Resources (EHR) Programs at AAAS. EHR includes programs in education, activities for underrepresented groups, and public understanding of science and technology. Malcom was head of the AAAS

Office of Opportunities in Science from 1979 to 1989. Between 1977 and 1979, she served as a program officer in the Science Education Directorate of the National Science Foundation (NSF). Before this, she held the rank of assistant professor of biology, University of North Carolina, Wilmington. Other work experience includes two years as a high school science teacher.

Malcom received her PhD in Ecology from The Pennsylvania State University; Master's in Zoology from the University of California, Los Angeles; and Bachelor's with distinction in Zoology from the University of Washington. In addition, she holds 15 honorary degrees.

Malcom serves on several boards, including the Heinz Endowments, Commission on Professionals in Science & Technology, and University Corporation for Atmospheric Research. She serves as a trustee of Caltech and as a Regent of Morgan State University. In addition, she has chaired a number of national committees addressing education reform and access to scientific and technical education, careers, and literacy. In

2003, Malcom received the Public Welfare Medal of the National Academy of Science, the highest award granted by the Academy.

She was a member of the National Science Board, the policymaking body of NSF, from 1994 to 1998 and of the President's Committee of Advisers on Science and Technology from 1994 to 2001.



## **Cora B. Marrett**

Cora B. Marrett is the Assistant Director of the Directorate for Education and Human Resources (EHR) at the National Science Foundation (NSF). She leads the NSF's mission to achieve excellence in U.S. science, technology, engineering,

and mathematics (STEM) education with oversight of a budget of approximately \$750 million and a staff of 150. EHR is the principal source of federal support for strengthening STEM education through education research and development (R&D).

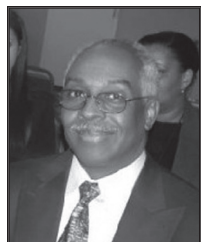
Prior to her appointment at the NSF, Marrett served as the Senior Vice President for Academic Affairs in the University of Wisconsin System. Her NSF position is in conjunction with the UW-Madison Department of Sociology, where she remains a tenured faculty member.

Earlier, she held the post of Senior Vice Chancellor for Academic Affairs and Provost at the University of Massachusetts-Amherst. Her current position represents a return to NSF. From 1992-1996, she served at the NSF as the first Assistant Director of the Directorate for Social, Behavioral and Economic Sciences. She received the NSF's Distinguished Service Award for her leadership in developing new research programs and articulating the scientific projects of the directorate.

In addition to her faculty appointment at the University of Wisconsin-Madison, she has been a faculty member at the University of North Carolina and Western Michigan University. Marrett holds a B.A. degree from Virginia Union University, and an M.A. (1965) and Ph.D. (1968) degrees from UW-Madison. She has an honorary doctorate from Wake Forest University (1996). She is a Fellow of the American Association for the Advancement of Science, the American Academy of Arts and Sciences, and Sigma Xi, the Science Research Society.

In 2005, Marrett received the Erich Bloch Distinguished Service Award from the Quality Education for Minorities (QEM) Network, given annually to an individual who has made singular contributions to the advancement of science and to the participation of groups underrepresented in science, technology,

engineering, and mathematics. She is widely published in the field of sociology, and has held a number of public and professional service positions.



## Larry Mattix

Larry Mattix is Professor of Physics at Norfolk State University. In 2002, he became the Associate Dean of the School of Science and Technology. Mattix is the Project Director for the STARS Program (Science and Technology Academicians

on the Road to Success), Norfolk State University's HBCU-UP Implementation Project. He directs and coordinates the University's graduate Title III activities in Materials Science and led the development of the PhD Program in Materials Science and Engineering, which begins in the fall of 2007. His area of research specialization is magnetic relaxation in solids and the applications of magnetic resonance to structural polymers. His research and educational efforts have resulted in numerous publications and external federal, state, and private funding.

Mattix has more than 30 years of experience in higher education. Before his appointment as Associate Dean, he served as Director for the Center for Materials Research at Norfolk State University for three years. He was Chairman of the Department of Physics at Norfolk State University for three years. In 1985, Mattix helped to found the Dozoretz National Institute for Mathematics and Applied Science, a science honors program at Norfolk State University. He served as its Director for more than 12 years.

He graduated from Clark-Atlanta University (then Clark College) in Atlanta, Georgia, with a Bachelor of Science in Physics. He earned MS and PhD degrees in Solid State and Materials Physics from the University of Illinois in Urbana and the College of William and Mary in Williamsburg, Virginia, respectively. He is a member of Alpha Kappa Mu honor Society, Beta Kappa Chi Honor Society, and Sigma Xi Research Honor Society. Mattix was also an Alpha Phi Alpha Fraternity Scholar, an Institute for Services to Education Fellow, and a National Research Council (NRC) Postdoctoral Fellow at the Naval Research Laboratory in Washington, D.C.



## Camille A. McKayle

Camille A. McKayle received her B.S. in Mathematics from Bates College, Lewiston ME, and went on to receive her Ph.D., also in Mathematics, from Lehigh University, in Bethlehem PA. She taught for three years at Lafayette College, Easton PA,

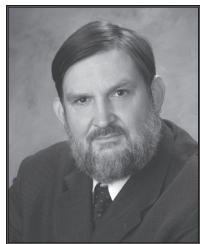
before moving to the Virgin Islands in 1996, where she remains Associate Professor of Mathematics at the University of the Virgin Islands.

McKayle served as co-Principal Investigator and project director for the NSF Historically Black College and University Undergraduate Program (HBCU-UP) project at the University of the Virgin Islands (UVI), as well as a variety of other grant projects at the university that aimed to strengthen the quality of the preparation that UVI students in science and mathematics, with an overall goal of increasing the number of students that choose graduate study in a Science, Technology, Engineering or Mathematics (STEM) disciplines.

Beginning Fall 2005, McKayle has been at the National Science Foundation, in the role of Program Officer for the Historically Black Colleges and Universities Undergraduate Program in the Division of Human Resource Development, in the Directorate for Education and Human Resources. This program reaches approximately 59 of the 103 HBCUs through planning grants, implementation grants, education research grants and targeted infusion grants in a particular STEM area.

In addition to her classroom activities, McKayle has been quite active in a variety of outreach activities aimed at increasing interest in science and mathematics for students in grades 3 through 12. These activities include GEMS (Girls Exploring Math Stuff) for 6th grade girls, MathLab for students in third through seventh grade, Science Awareness Saturday Academies and Summer Science Enrichments Academies. Through these activities, she tries to relay her love and enjoyment of mathematics to elementary, middle, and high school students. She has also participated as organizer and presenter in workshops for mathematics teachers in the Virgin Islands.

# Biographies



## **Terry McGuire**

Terry McGuire is an Associate Professor and Vice Chair in the department of genetics at Rutgers University. He obtained his B.A. from The Ohio State University and his Ph.D. from the University of Illinois at Urbana Champaign. He has been published

in many different areas including Mendelian and mathematical genetics, behavioral and neural genetics, and ecological genetics. He has designed and taught a wide range of courses within the department of genetics.

McGuire has been an active participant in the SENCER (Science Education and the New Civic Engagements and Responsibilities) project since 2002. He was appointed as a SENCER senior associate in 2004. He is the author of a SENCER backgrounder describing his journey as a professor. He is co-director of the MidAtlantic Regional SENCER Center for Innovation and the CASA project (Consortium for the Assessment of Student Achievement). Through the SENCER projects he works on adapting the SENCER model to courses for science majors. In 2006 he was appointed as a BEN Scholar (BioSciEdNet) and in 2007 became a Presidential CASTL Faculty Fellow at Rutgers University (Carnegie Academy for the Scholarship of Teaching and Learning).



## **Carolyn W. Meyers**

Carolyn W. Meyers, the fourth president of Norfolk State University, previously served as Provost and Vice Chancellor for Academic Affairs and a tenured Professor in the College of Engineering at North Carolina Agricultural & Technical State

University. Meyers holds a bachelor's degree in mechanical engineering from Howard University, a master's in mechanical engineering from the Georgia Institute of Technology (Georgia Tech), and a Ph.D. in chemical engineering, also from Georgia Tech. She conducted postdoctoral work at the Harvard University's Institute for Educational Management.

Meyers career in higher education spans more than 30 years and includes both academic and administrative experiences. She served as the first Associate Dean of Research for the College of Engineering at Georgia Tech and was later appointed Professor and Dean of the College of Engineering at North Carolina A&T State University. She was a Program Officer in two divisions of the National Science Foundation—the Division of Undergraduate

Education (DUE) and the Division of Human Resource Development (HRD).

She has served on numerous boards and committees, including serving as the first Chair of the Board of Directors of the National Institute of Aerospace, Board of Trustees of the North Carolina School of Science and Mathematics and the Moses Cone Health Systems. She holds membership on the Board of Trustees of Norwich University, MentorNet, the Center for the Advancement of Engineering Education, the Board of Governors for RTI International, the Advisory Board for the *Journal of Engineering Education*, the Board of Directors of Riverside Health Foundation, Hampton Roads Partnership, Hampton Roads Chamber of Commerce, the Greater Norfolk Corporation, Nauticus, the Innovative Technology Authority, and the Historically Black Colleges and Universities Capital Financing Advisory Board. Currently, she is serving a second term as a member-at-large of the American Society of Mechanical Engineers Committee on Honors and is a member of the State Council of Higher Education for Virginia's 2007 Assessment Task Force, and the American Council on Education Commission on Effective Leadership.

She was inducted into the Academy of Distinguished Engineering Alumni at Georgia Tech. Other awards include the NSF Presidential Young Investigator Award, Society of Automotive Engineers' Ralph A. Teetor Award, and the National Society of Black Engineers' Golden Torch Award.

Meyers is a native of Newport News, VA and is married to James E. Cofield, Jr. of Boston. They are the parents of four adult children, and the adoring grandparents of two.



## **Joe Omojola**

Joe Omojola is currently a Professor of mathematics and physics at Southern University at New Orleans (SUNO). He is also the Campus Coordinator for SUNO's Louisiana Alliance for Minority Participation (LAMP), the director of SUNO's component

of the Graduate Alliance for Education in Louisiana (GAELA), and one of two managers for the Program for Excellence in Science, Mathematics, and Computer Technology (PESMaCT). Between these programs, over half a million dollars per year in grants funding is attracted to SUNO. Previously, Omojola served as the Dean of the College of Science and as the Chair of the Department of Mathematics and Physics.

Results of Omojola's mentoring work among the poorest minority population are very impressive. For instance, five of Omojola's former students from SUNO and one from Dillard University are currently in graduate schools in mathematics and physics. In 2006, Omojola was awarded The National Role Model Award for his dedication and commitment to the education of minority and women and for increasing opportunities for the same group, in the science, technology, engineering, and mathematics (STEM) workforce. Additionally, Omojola was nominated for the Presidential Awards for Excellence in Science, Mathematics, and Engineering Mentoring (PAESMEM).

Through grants and other related activities, Omojola has been able to foster effective collaborations with public school teachers from the New Orleans Public Schools (NOPS) system and faculty members from other institutions. Omojola has been a model of passion, commitment, and dedication to teaching, mentoring, and research. The broader impact of Omojola's work is seen in the number of his students being drawn into mentoring and teaching.



## Ashanti J. Pyrtle

Ashanti J. Pyrtle is an Assistant Professor at the College of Marine Science, University of South Florida (USF). Pyrtle received her B.S. (1993) in Marine Science from Texas A&M University-Galveston and her Ph.D. (1999) in Oceanography from

Texas A&M University.

Before joining the University of South Florida she served as a research faculty member for the Georgia Institute of Technology School of Earth & Atmospheric Sciences and the Savannah State University Marine Science Program. Her research focuses on the utilization of various biogeochemical indicators to interpret past events that have impacted the marine, estuarine and freshwater environments.

She is currently advising or co-advising 15 graduate students that are examining the distribution and behavior of man-made pollutants and naturally occurring radionuclides in Puerto Rico, Tampa Bay (Florida), and Savannah (Georgia) riverine-estuarine-marine systems. In addition to her research activities, Pyrtle is currently involved in several endeavors designed to facilitate research and professional development experiences for students representing diverse socioeconomic, cultural, gender, racial and academic backgrounds. She serves as the Director of the *Minorities Striving and Pursuing Higher Degrees of Success*

in *Earth System Science Initiative* ([www.msphds.usf.edu](http://www.msphds.usf.edu)), the National Science Foundation (NSF) *Florida-Georgia Louis Stokes Alliance for Minority Participation USF Bridge to the Doctorate Program* (<http://www.msphds.usf.edu/BDFellowship/>) and the *Sloan Foundation's Minority Ph.D. Program* in the USF College of Marine Science (<http://www.nacme.org/sloan/>).

Pyrtle also co-directs the *USF College of Marine Science OCEANS GK-12 Fellowship Program* (<http://www.marine.usf.edu/students/fellowships/GK12/>) and serves on the NSF Advisory Committee on Environmental Research and Education, the American Geophysical Union Committee on Education and Human Resources, the International Safe Water Conference Steering Committee, the Florida-Georgia Louis Stokes Alliance for Minority Participation Advisory Board, and the Howard University Science, Engineering, and Mathematics Program External Advisory Board.



## Victor A. Santiago

Victor A. Santiago is Acting Director of the National Science Foundation's Division of Human Resource Development (HRD). HRD serves as a focal point for NSF's agency-wide commitment to enhancing the quality and excellence of science,

technology, engineering, and mathematics (STEM) education and research by broadening participation in STEM fields. HRD programs: (1) Diversify the human resource and institutional base on which the nations performance in science, technology, engineering, and mathematics depends, (2) Increase research and education opportunities for women, minorities, and persons with disabilities and (3) Increase the involvement of faculty from minority-serving institutions in the nation's STEM enterprise.

Prior to his appointment at the National Science Foundation, Santiago was an Associate Professor of Earth Science at Inter American University of Puerto Rico. There, he also held several administrative positions including Dean of Science and Technology. Santiago earned a Ph.D. at the University of Michigan.

# Biographies



## **Sadanand Srivastava**

Sadanand Srivastava is a Professor and Chair of the Department of Computer Science. He has been associated with the Bowie State University (BSU) for the last 37 years. His teachings in India, Canada, and Iraq have provided him with a global

perspective in education.

Srivastava has been engaged in active research throughout his career. His work has been published in national and international journals. His areas of interest have been applied analysis, computational methods, artificial intelligence, and user interface systems. Throughout his tenure at BSU, Srivastava has been working on funded projects with NASA, the Department of Defense, and NSF.

Srivastava is Project Director of the project BETTER (NSF: HBCU-UP Program). He was Conference Chair for the 7th Annual HBCU-UP Conference in Baltimore. He is principal investigator (PI) of the grant Implementing Community-Based Participatory Research...Women (an NSF-funded project). Srivastava is the Institutional Director of the Chesapeake Information-Based Aeronautics Consortium (a NASA-funded project).

He was PI of several funded research projects, such as a multi-year (1998–2003) NSF infrastructure grant (Project LEARN), a 3-year (1999–2002) NSF collaborative grant (CERI), a NASA grant (Agent-Based Information Processing Systems), and an NSA/UMBC grant (Document Ontology and Agent Monitors). He was an institutional representative on MCTP (an NSF-funded project for the Maryland Collaborative Teachers Preparation program).

Srivastava was a member of the Board of Directors for MAITI (Maryland Applied Information Technology Initiative) and was also a member of the Advisory Board for GAANN (Graduate Assistance in Areas of National Need).



## **Michael Smith**

Michael Smith is a digital media specialist with NSF Broadening Participation in Computing Digital Library Project and a program manager with the NSF HBCU Research Alliance for Graduate Studies in Computer Sciences at the University

of California, Berkeley. A pioneer in video content analysis and search, Smith developed and patented technology for video search, metadata creation and summarization, as part of the Informed Video Library project at Carnegie Mellon. He is the

author of numerous papers and a recent book on multimodal video characterization and summarization. He has worked as a visiting professor at the University of Texas in Austin, Morehouse College, the University of Campinas, Brazil and the University of California at Berkeley. He developed a digital media research program at the University of Trinidad and Tobago and he recently completed a Fulbright Grant in South Africa where he developed curriculum and research modules in computational media. Smith holds a PhD in Electrical and Computer Engineering from Carnegie Mellon University, a master's degree in Electrical Engineering from Stanford University and a bachelor's degree from Tuskegee University and North Carolina A&T State University.



## **Marilyn J. Suiter**

Marilyn J. Suiter is a geologist and educator with more than twenty-five years of experience. She is a Program Director in the Education and Human Resources Directorate (EHR) at the National Science Foundation (NSF). Her

responsibilities are in (geo) science education and diversity issues as they are implemented in K-12, undergraduate, and graduate education. Suiter recently completed a fifteen-month detail in the Budget Division of the NSF Office of Budget, Finance and Award Management (BFA). The position involved NSF-wide performance activities including, but not limited to: The Government Performance and Results Act, OMB's Program Assessment Rating Tool and Budget-Performance integration activities in the President's Management Agenda, with particular focus on the Advisory Committee for GPRA Performance Assessment. She is currently a program officer with the Historically Black Colleges and Universities Undergraduate Program, and the CREST/SBIR-IIP partnership, and manages the Cooperative Activity with Department of Energy Programs for Education and Human Resource Development.

Suiter's career has included positions as Director of Education and Human Resources at the American Geological Institute, Exploration Geologist for Cities Service Oil & Gas, Geologist for the U.S. Geological Survey, and educator positions at American University and in the Philadelphia Public Schools. In addition to her wide-ranging interests and experience in geosciences education and workforce issues, she retains a special interest in activities in professional societies and has held offices in the

Association for Women Geoscientists, the Association for Women in Science, and the Geological Society of America.



## **Sandra H. Thomas**

Sandra H. Thomas is currently the Executive Director of the Institute for Broadening Participation and Senior Administrator for the IGERT National Recruitment Program. Previously, Thomas was the Vice President for Programs at the Island Institute, a

small nonprofit educational organization on the coast of Maine. She also developed and directed an international fellowship program sponsored by the U.S. Agency for International Development (USAID). She has over 20 years of experience in the administration of interdisciplinary science and education projects at the University of Michigan, primarily in environmental sciences. Her experience includes all aspects of project management and student recruitment and retention. She played a central role in developing one of the first successful IGERT proposals at the University of Michigan in 1999.



## **Gregory Triplett**

Gregory Triplett is an Assistant Professor, Electrical and Computer Engineering at the University of Missouri at Columbia. He received his B.S. in electrical engineering from Florida Agricultural and Mechanical University and M.S. in electrical engineering

from Florida State University. He completed his PhD as a member of the Intelligent Semiconductor Manufacturing Group at the Georgia Institute of Technology. He publishes in electronics, nanotechnology, and computer architecture venues. He is a member of numerous professional organizations including the American Society for Engineering Education (ASEE), the National Society of Black Engineers (NSBE), the Institute for Electrical and Electronic Engineers (IEEE), the IEEE Electron Devices Society, and Sigma Xi Scientific Research Society.

Triplett's activities include compound semiconductor device research, optoelectronics technology, and artificial intelligence tools geared towards the development of next-generation imaging and sensing applications.

Triplett has been an invited speaker for numerous seminars, workshops, and symposiums that include both research and academic topics. He was a University of Missouri New Faculty Teaching Scholar and was twice awarded the Outstanding

Teaching Award in the Department of Electrical and Computer Engineering. He has developed the Compound Semiconductor Research Laboratory (CSRL) at the University of Missouri that focuses on the development of quantum cascade lasers for infrared applications and thermal management schemes for high power laser applications.



## **Pratibha Varma-Nelson**

Pratibha Varma-Nelson is Professor of Chemistry and Chair of the Department of Chemistry, Earth Science and Physics at Northeastern Illinois University (NEIU), Chicago. She received her B.Sc. in Chemistry with first class from the

University of Poona, India, in 1970 and a Ph.D. in 1978 from the University of Illinois in Chicago in Organic Chemistry. The title of her thesis was "Protein Ancestors: Heteropolypeptides from Hydrogen Cyanide and Water."

From 1977-1979 she studied the effect of essential catalytic residue modifications on conformation and binding affinity in anhydro-chymotrypsin while she completed a postdoctoral fellowship in enzymology at the Stritch School of Medicine, Loyola University, Maywood, Illinois before joining the faculty of Saint Xavier University, Chicago in 1979. At SXU she taught courses in Organic Chemistry and Biochemistry and Environmental Science.

In 2002 she was awarded the SXU Teacher-Scholar Award. She moved to NEIU in July of 2002. At NEIU she teaches a capstone seminar to chemistry majors and a course on the chemistry of biological compounds. Since 1995 her professional activities have revolved around the development, implementation and dissemination of the Peer-Led Team Learning (PLTL) model of teaching. She has been an active partner of the Workshop Chemistry Project one of the five NSF Systemic Reform Projects in Chemistry. She has been a Co-PI on two National Science Funded (NSF) National Dissemination Grants awarded to PLTL and Co-PI on the "Multi Initiative Dissemination" (MID) project. She has co-authored several publications and manuals about the PLTL model. Varma-Nelson is the Director of the Workshop Project Associate (WPA) Program, which provided small grants to facilitate implementation of PLTL and is currently director of the annual Chautauqua course on PLTL. In addition, she was a Co-PI of the first NSF funded Undergraduate Research Center (URC), Center for Authentic Science Practice in Education, (CASPiE).

# Biographies



Wanda E. Ward is the Deputy Assistant Director (Acting) for Education and Human Resources. Throughout her tenure at NSF, Ward has served in a number of science and engineering policy, planning, and program capacities. These include: Acting Assistant Director for Education and

Human Resources (Summer 2006 – January 31, 2007), Acting Assistant Director for Social, Behavioral and Economic Sciences (2004-2005), Deputy Assistant Director for Social, Behavioral and Economic Sciences (1999-2007), Assistant to the Deputy Director for Human Resource Development, Office of the Director (1997-1999), Senior Staff Associate for Policy and Planning, Office of the Assistant Director, Directorate for Education and Human Resources (EHR; 1994-1997), and Program Officer in EHR (1992-1994).

From 2001-2002 she was on assignment at the Council on Competitiveness as Chief Advisor to the new initiative, BEST (Building Engineering and Science Talent) where she provided leadership in the launch and development of this public-private partnership, established to carry out the implementation of a national diversity initiative called for by the Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development. In SBE, Ward provided critical leadership for development of several NSF-wide activities, including the Human and Social Dynamics priority area, the Science of Learning Centers program, Cyberinfrastructure and the Social Sciences, and the ADVANCE program. She also directed the launch and development of a major activity in SBE to broaden participation through strategic, regional alliances among the top 25 institutional producers of underrepresented minorities at the B.S. and Ph.D. levels. These endeavors led her to forge international research and workforce development collaborations in both developed and developing nations, including China, Europe, and South Africa.

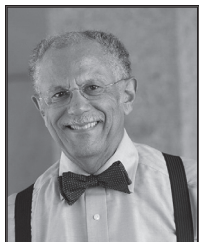
Since joining the Foundation, Ward has also led or served on several NSF and interagency task forces, working groups, commissions and committees. These include: Co-Chair, Subcommittee on Social, Behavioral and Economic Sciences (SBES), the President's National Science and Technology Council (NSTC) Committee on Science (COS) 2004-2005; NSF representative to the Interagency Working Group on the U.S. Science and Technology Workforce of the Future, NSTC COS (1997-1999); Executive Liaison to the Co Vice-Chair of the NSTC former Committee on Education and Training (CET);

and Executive Secretary of the NSTC CET Subcommittee on Excellence in Science, Mathematics, and Engineering Education (1994-1996). In this latter capacity, she played a key role in the initial interagency planning, development, and implementation of the Presidential Awards for Excellence in Science, Mathematics, and Engineering Mentoring Program (PAESMEM), established by the White House Office of Science and Technology Policy and administered by the National Science Foundation. In 2005, the NSTC COS SBES published the report, *Combating Terrorism: Research Priorities in the Social, Behavioral and Economic Sciences*.

Prior to joining NSF, Ward served as tenured Associate Professor of Psychology and Founding Director of the Center for Research on Multi-Ethnic Education at the University of Oklahoma, Norman. She has also held academic positions at the University of Illinois at Urbana-Champaign and the Johns Hopkins University Center for Social Organization of Schools. She took the B.A. in Psychology and the Afro-American Studies Certificate from Princeton University and the Ph.D. in Psychology from Stanford University.

She was awarded the Ford Foundation Fellowship, and is a member of the American Psychological Society, the American Association for the Advancement of Science, and the American Psychological Association (APA), where she was awarded the 2005 APA Presidential Citation, the most distinguished award given by the APA president, in recognition of her steadfast support of the advancement of behavioral science and her devotion to enhancing the diversity of the science and engineering workforce. Ward received the prestigious 2006 Presidential Rank Award for Distinguished Executive, awarded annually by the U.S. President to one percent of career members of the Senior Executive Service, Senior Level, or Scientific and Professional corps for their outstanding leadership, accomplishments and service over an extended period of time in some of the nation's most critical positions in the federal government. Finally, Ward was selected to receive the 2006 Richard T. Louttit Award, the only award given by the Federation of Behavioral, Psychological and Cognitive Sciences, in recognition of behavioral and brain scientists whose careers have strengthened and brought honor to the science, and have advanced the capability of behavioral research to serve the public good.





## Warren M. Washington

Born in Portland, Oregon, Warren M. Washington earned a bachelor's degree in physics and a master's degree in meteorology from Oregon State University. After completing his doctorate in meteorology at Pennsylvania State

University, he joined National Center for Atmospheric Research (NCAR) in 1963 as a research scientist. Washington's areas of expertise are atmospheric science and climate research, specializing in computer modeling of the earth's climate. Washington is a Senior Scientist and Head of the Climate Change Research Section at the NCAR in Boulder, Colorado. This group uses state-of-the-art computer climate models to study present and future climate change. His expertise is in atmospheric and climate research. These models are made up of atmospheric, ocean, land/vegetation, and sea ice components. His involvement in research for more than forty years has made him a much sought after individual for advice, testimony, and lecturing on global climate change.

Washington has served on numerous committees and panels, among them the U.S. President's National Advisory Committee on Oceans and Atmosphere from 1978-1984. He has had Presidential Appointments under Carter, Reagan, Clinton, and Bush, Jr. Administrations. He served on the National Science Board from 1994 to 2006 and was Chair from 2002 to 2006. (The accomplishments of the NSB during his tenure can be accessed on the Web (<http://www.cgd.ucar.edu/ccr/warren/NSBaccomplishments.pdf>).

He has over 120 publications and co-authored with Claire Parkinson a book considered a standard reference on climate modeling -- *An Introduction to Three-Dimensional Climate Modeling* (2005) and an autobiography—*Odyssey in Climate Modeling, Global Warming, and Advising Five Presidents*. Washington has many awards including being a member of the National Academy of Engineering, Presidency of the American Meteorological Society (1994), and a member of American Philosophical Society. He is a Distinguished Alumnus of Pennsylvania State University and Oregon State University (OSU). In addition, he was the spring commencement speaker at OSU in 2006 and received an honorary Ph.D.



## Richard Weibl

Richard Weibl is Director of the AAAS Center for Careers in Science and Technology ([www.aaas.org](http://www.aaas.org)). He works with AAAS career development programs to strengthen their offerings and to create new opportunities to support

the career aspirations and development needs of future and current scientists. Weibl joined AAAS in 2005 after a tour of service in the U.S. Peace Corps as an education and community development volunteer based in the Northwest Province of South Africa. Before the Peace Corps, Weibl served as U.S. editor for Science's Next Wave ([www.sciencecareers.org](http://www.sciencecareers.org)) and as editor at Next Wave's Postdoc Network (now the National Postdoctoral Association, [www.nationalpostdoc.org](http://www.nationalpostdoc.org)). From November 1996 to June 2001, he was manager of the national Preparing Future Faculty ([www.preparing-faculty.org](http://www.preparing-faculty.org)) program and Director of Programs, Education and Institutional Initiatives at the Association of American Colleges and Universities and the Council of Graduate Schools. Earlier, he served in research and administrative positions at Antioch College, Ohio State University, Marquette University, Longwood College, and University of Georgia. You can contact Weibl at, Director, Center for Careers in Science and Technology, AAAS, 1200 New York Ave., NW, Washington, DC 20005. Email: [rweibl@aaas.org](mailto:rweibl@aaas.org), [www.aaascenterforcareers.org](http://www.aaascenterforcareers.org).



## Catherine Dinitra White

Catherine Dinitra White is the Assistant Professor of Biology at North Carolina Agricultural and Technical State University located in Greensboro. She graduated from Johnson C. Smith University with a B.S. in biology and attended Wayne

State University in Detroit, MI where she received a Ph.D. in Microbiology and Immunology in 2002.

She recently completed a postdoctoral fellowship in the Seeding Postdoctoral Innovators in Research and Education (SPIRE) program at the University of North Carolina at Chapel Hill. The goal of the SPIRE program is to 'provide multi-dimensional professional development for science researchers and educators to succeed in academic careers, to bring engaging teaching methods into the classroom, and to increase diversity in science professions'. SPIRE fellows engage in two years of cutting-edge research at the University of North Carolina at

# Biographies

Chapel Hill, Duke University, or North Carolina State University while participating in comprehensive seminars that serve as an introduction to the theory and practice of college teaching. During the third year, SPIRE fellows teach for a one year term at one of eight Historically Minority Universities in North Carolina.

During her fellowship, White committed a year of teaching between Johnson C. Smith University in Charlotte, NC and Fayetteville State University in Fayetteville, NC. As a result of her experience in SPIRE, she is familiar with various pedagogical techniques emphasizing technology in the classroom. Currently, she is teaching molecular biology and introductory concepts in biology with an emphasis on improving students' understanding of the relationship between biology and mathematics through concept application. In the laboratory, she continues to build on several years of biomedical research focusing on infectious diseases. White's eventual goal is to develop a research program where both undergraduate and graduate students perform competitive research and generate data that will ultimately be used in the biology classroom.

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# Abstracts

## Faculty Poster Abstracts

### 1. National Science Foundation HBCU-UP Computational Science Project, Bennett College for Women

*Sharice Adams (Assistant Project Manager), Bennett College for Women*

*Margaret W. Curtis, Bennett College for Women*

*Sekhara Rao Basavaraju, Bennett College for Women*

The Bennett College for Women Computational Science Project is entering its third year of successful activities. Our project focus on computational science gives us a unique opportunity to introduce science students to one of the most important technical fields of the 21st century. The project is designed to infuse computational science in selected courses in biology, chemistry, mathematics, and computer science. The objectives of the project are to 1) increase recruitment, retention, and graduation rates of students in science, technology, engineering, and mathematics (STEM) fields; 2) enhance the scholarly productivity and technological expertise of STEM faculty; and 3) revise the STEM curriculum to better prepare students to enter graduate and professional schools and assume productive careers in new interdisciplinary fields. Major activities of the project portrayed in our poster include our STEM Fair, which attracted high school students from the surrounding area and featured a guest scientist from Norfolk State University. Other photos show our colloquia as students listen to visiting computational science experts. Computational science training sessions were conducted for faculty and students. Additionally, our poster includes a sample module designed as part of our curriculum development component and photos of a computational science research project. The National Science Foundation Summer Academy photos represent the type of activities conducted under our recruitment component. Project visibility was significantly increased by publication of a newsletter, distribution of fliers, and development of a webpage. The logo selected and adapted for our project includes three colorful, intersecting circles. The circles represent science, mathematics, and computer science, while computational science is positioned at the cross-section of science, mathematics, and computational science. These experiences will enable Bennett students to have a competitive edge for careers in the 21st century. The project is supported by the National Science Foundation, Award #0506155.

### 2. Cross-Disciplinary Curriculum for Enhancing Performance and Retention of Incoming Freshmen

*Muhammad Ali (Associate Professor), Tuskegee University*

The STEM (science, technology, engineering, and mathematics) Summer Bridge Program is a component of the Tuskegee University's HBCU-UP, funded by the National Science Foundation. The objectives of this program are to 1) attract outstanding high school graduates with interest in STEM disciplines; 2) develop and follow a curriculum to enhance the basic learning and inquiry skills of these students, using simulation and modeling techniques (these skills prepare them for undergraduate research); and 3) introduce the use of simulation and modeling techniques in the mainstream teaching efforts in the university, by training and involving several faculty members in this program. The curriculum covers four skills: critical thinking, problem-solving, programming, and mathematical skills. Competence in these skills prepares the students to deal with the complete range of problems they may encounter in academic and personal domains. Although the eight-week program cannot develop high level of competence in these skills, the students become aware of the usefulness of these skills and the need to further develop these skills as a lifelong learning process. "Problem-solving" skills prepare students to solve structured problems with analytical solutions, typically encountered in high school as well as in the freshmen and sophomore years. More complex

problems have algorithmic solutions but no analytical solutions. These problems require programming skills. Finally, problems that do not fall in either of these two categories require critical-thinking skills to solve them. Improved mathematical skills improve success rate for students across STEM disciplines. The first implementation of the program took place in summer 2006. It was very successful, and we achieved 100% retention of students. We also observed that strong connections and communications develop among students from various disciplines, a prerequisite for successful multidisciplinary research. [This work was supported in part by the Tuskegee University National Science Foundation HBCU-UP grant (#0411464).]

### 3. Exposing High School and Undergraduate Scholars to Geospatial Information Technologies and Water Quality Management

*Arthur Allen (Associate Professor/Associate Research Director),  
University of Maryland Eastern Shore*

*Brian Needelman, University of Maryland-College Park*

*Peter Klienman, USDA-ARS, University Park Pa.*

*Fawzy Hashem, University of Maryland Eastern Shore*

During the summers of 2005 and 2006, 40 high school students (grades 10–12) participated in a two-week internship program on the campus of the University of Maryland Eastern Shore (UMES). These students received intensive training in water quality management and geospatial information technologies. Experiential learning activities included mapping drainage ditches using geographical information system (GIS) and global position system (GPS) applications and testing soil and water samples for nitrogen, potassium, phosphorus, sulfur, and pH. Water samples were analyzed for electrical conductivity, salinity, and suspended sediments. Interns also participated in rainfall demonstrations and learned about the effects of soil erosion on surface water pollution. They also classified soil profiles based on texture and color differences and conducted experiments with mesocosms. Students were also involved in a three-day Environmental Systems Research Institute workshop and were introduced to ArcGIS and GPS. Interns generated and presented poster and PowerPoint presentations on their various projects. Twelve undergraduates also received training in the geosciences during this same period; they were placed with various local agencies in Maryland. They remained with these agencies for the summer, where they completed various GIS- and GPS-related projects before returning to UMES. They also generated and presented posters and PowerPoint illustrations reflecting their summer experiences.

### 4. Mathematics, Computers, and Biosciences—A New Course for Biology Majors

*Helen Benford (Professor), Tuskegee University*

*John Bales, Tuskegee University*

*John P. Davidson, Tuskegee University*

*Douglas R. Hileman, Tuskegee University*

Modern bioscience inquiry increasingly incorporates mathematical and computational analysis, yet the need for expanded integration of quantitative skills into their training is not always apparent to biology majors. Moreover for some, deficits in mathematics and study skills undermine confidence, performance, and career progression. The relevance of traditional mathematics courses to biology is not clear to students, and transfer of mathematics concepts into biology courses is limited. Mathematics and biology faculty have developed a team-taught course for biology majors, Mathematics, Computers, and Biosciences (MCB), that helps establish crucial linkages between biology and mathematical and computational concepts. Modules developed for MCB include standard curves, spreadsheets, solution-making, statistical tests, genetic testing,

and false positives and negatives, bioinformatics, and phylogenetic trees. Modules are taught as a balanced mix of lecture and in-class exercises, with regular homework for reinforcement. The focus is on increasing students' problem-solving ability, confidence, and interest, with the goal of motivating them to integrate mathematics and computers more fully into their course electives, selection of internships, and career planning. The MCB course has been field-tested twice with a small numbers of students. Student attitudes and self-assessed skills have been analyzed via pre- and post-course surveys. Measures of course quality received high marks from the students, who felt that MCB should be required of all sophomore biology majors, possibly in place of part of the traditional mathematics requirement. [This work was supported in part by the Tuskegee University National Science Foundation HBCU-UP grant (#0411464).]

## 5. UAPB STEM Summer Academy

*Charles Colen (Chair), University of Arkansas at Pine Bluff*  
*Mary E. Benjamin, University of Arkansas at Pine Bluff*  
*Clifton Orr, University of Arkansas at Pine Bluff*  
*Charles R. Colen, Jr., University of Arkansas at Pine Bluff*  
*Mansour Mortazavi, University of Arkansas at Pine Bluff*

The UAPB TEM (science, technology, engineering, and mathematics) Summer Academy is a 10-week summer program to enhance, enrich, and refresh incoming first-year students in the areas of mathematics, writing, college survival, computer, biology, and chemistry skills in preparation for their college career in the sciences. The Academy assesses student achievement with formative and summative evaluations to measure their progress as STEM scholars. The Academy seeks to expose students to the STEM curriculum required to be successful in a STEM major on the campus of the University of Arkansas at Pine Bluff.

## 6. A New Model for the Integrated Engineering Degree Program

*Ali Eydgahi (Professor and Chair), University of Maryland Eastern Shore*

A pre-engineering program at the University of Maryland Eastern Shore (UMES) was established in 1982 when UMES proposed and received support for a program consisting of the first two years of curricula for different engineering fields. At that time, NASA supported the universities' effort with funding to recruit minorities and women through scholarships, outreach programs, and extensive counseling and tutoring programs. The pre-engineering curricula were a mirror image of the University of Maryland College Park (UMCP) curricula for its first two years. It was expected that engineering students would matriculate to UMCP or other 4-year engineering institutions after their sophomore year. As a next step in the process of introducing 4-year engineering programs on the eastern shore, a memorandum of understanding was signed by presidents of UMCP, UMES, and Salisbury University (SU) to establish a 4-year Collaborative Electrical Engineering Program at UMES and SU in 1997. As a result of these collaborations, UMES as a land grant institution is exploring the process of introducing independent 4-year engineering programs to fulfill its land grant mission. The initial offering of the bachelor of science degree in engineering with a concentration in electrical, computer, mechanical, or aerospace is under consideration. The initial offering is chosen as a result of ongoing collaboration with UMCP and SU. In this paper, the new engineering model that has been proposed for implementation at UMES is presented. This program offers unique curricula that have been designed to meet the needs of underrepresented and minority students on the eastern shore of Maryland.

## 7. Engineering Research Initiated by the BETTER-Mini Grant Program at Bowie State University: Student Outcomes

*Mikhail Goloubev (Engineering Research Initiated By BETTER-Mini Grants Program Director), Bowie State University*

During last three years, the BETTER-mini grant program at Bowie State University has been encouraging engineering activity for students interested in computer-aided design (CAD). During their involvement in this research, students were gaining designer skills working as Pro-Engineer modelers and were applying their knowledge toward projects of their choice. The subject of each project had been discussed and finalized before the grant submission, and students started learning about the Pro-Engineer software by taking an introductory engineering design course. Because of different students' majors and their career goals, research projects covered a wide range of gadget designs useful for their future occupations. Working in the same computer lab, students never tried to compete with each other but were actually creating a friendly environment, helping each other through all stages of their research without claiming this involvement as participation in the other project. This is why improvement of interpersonal team-player skills was one of the important benefits of each project. Each research had been planned and conducted as a full-scale design, including preliminary mathematical analysis, virtual modeling and testing, and prototype building. As a result, students became familiar with the most advanced technologies, further developed their analytical skills, learned new software, and created ready-for-patenting designs. Some students were offered jobs by temporary agencies as Pro-Engineer technicians.

## 8. Interdisciplinary Research and Curriculum Innovations for Aerospace Science Engineering and Psychology—“The Development of a Low-Cost Flight Simulation Environment to Enhance Education and Research”

*M. Javed Khan (Associate Professor), Tuskegee University*  
*Marcia Rossi, Tuskegee University*

The HBCU-UP grant at Tuskegee University consists of a number of approaches to undergraduate education involving interdisciplinary teams who collaborate either on research, curriculum development, or both. The Aerospace Science Engineering and Psychology team involves collaboration in both research and curriculum development. The main thrust of the team has been to develop and use a low-cost flight simulation environment (FSE) to enhance education and training in both aerospace science engineering and psychology. In aerospace science engineering, new modules were developed for courses that used the FSE. These include aircraft performance, stability and control, and aircraft design. A course in aircraft flight controls is under development as well. In psychology, a new interdisciplinary course in Human Factors Psychology was developed and introduced that uses the FSE for a laboratory research experience. The research experience was supervised by faculty from both disciplines. In addition, students in aerospace science engineering also participated in the research experience. [This work was supported in part by the Tuskegee University National Science Foundation HBCU-UP grant (#0411464).]

## 9. Ethics in the Information Technology Age: Developing a New Interdisciplinary Course

*Cynthia Lester (Assistant Professor), Tuskegee University*

Technology is an integral part of everyday life; its use has become a mainstay in today's society, growing larger with each new, more advanced, innovative system. Therefore, it is important that designers and developers of technology and computer systems understand the social, moral, and ethical implications that technology has on society and its many diverse users. The objective was to develop an interdisciplinary undergradu-

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ate course devoted to the study of the social, ethical, and legal effects of computing on society and its users. [This work was supported in part by the Tuskegee University National Science Foundation HBCU-UP grant (#0411464).]

## 10. Symmetric Classical Random Walks on the Line and the Half-Line

*Chaobin Liu (Assistant Professor), Bowie State University*  
*Elizabeth Coe, Bowie State University*  
*James Davis, Bowie State University*  
*Michael Kindlinger, Bowie State University*

In the simplest case of a classical random walk, a single particle moves on a two-way infinite, one-dimensional lattice. At each step, the particle jumps one position to the left or to the right, depending on the flip of a fair coin. For any random walk, the basic problem is to determine the expected position, in a probabilistic sense, of the particle at time  $t$ , where  $t$  is defined as the number of jumps. In this project, we examine two cases: CASE 1: Random walk without boundary. A single particle jumps either to the left or to the right, depending on the outcome of the toss of a fair coin. If the particle begins its journey in the zero position, then, after  $t$  steps, what is the probability of finding the particle at position  $n$ ? What is the rate at which the process evolves? What is the expected distance of the random walk from its starting position? What is the probability of being at a distance from the origin? All of these questions are answered in this project. CASE 2: Random walk with one boundary. An absorbing boundary is placed immediately to the left of the starting position zero. The process terminates when the particle reaches the boundary at position negative one. In this case, we address the following questions: What is the relationship between the hitting probability and the first hitting time? How does the hitting probability change as a function of time, especially as the time goes to infinity? How long will it take for the process to terminate in a probabilistic sense? Through this project, we answer all of these questions. The principles of random walks can be illustrated by way of computer simulations. In this project, we conduct various experiments, using the software package MAPLE, to display and verify some numerical properties of random walks. It is noteworthy that the theory of random walks has been generalized to more complicated lattices and to finite or infinite graphs. There exist some important applications in computer science, physics, etc. In particular, random walks can serve as tools in designing algorithms for graph connectivity.

## 11. Evaluative Research Study of the Honors STEM Program

*Arlene Maclin (Professor of Engineering/Director of the Center for Academic Excellence),*  
*Norfolk State University*  
*Alecia McClain, Norfolk State University*

This research includes a comprehensive evaluation of a full scholarship program at Norfolk State University (NSU), which serves principally African-American students in science, technology, engineering, and mathematics (STEM) disciplines. African-Americans are currently underrepresented in STEM areas. The emphasis of this program, which was initiated in 1985, was developed to encourage African-American students to pursue graduate degrees in STEM fields. The demonstrated success of this program seems to indicate that both current and former scholarship recipients have enjoyed considerably higher graduation rates as well as the ability to earn graduate and professional degrees at much higher rates than their peers. Factors that have contributed to this apparent success are discussed, and strategies are documented so that this program can be replicated for other students at NSU as well as at other universities.

## 12. Student Engagement: A Shared Responsibility

*Dawn McNair (Assistant Professor of Mathematics), Johnson C. Smith University*  
*Mark Barsoum, Johnson C. Smith University*  
*Ojay Johnson, Johnson C. Smith University*  
*Ahmed Faik, Johnson C. Smith University*

To address the growing problem of the historical under-representation of minorities in the science, technology, engineering, and mathematics (STEM) disciplines, Johnson C. Smith University, with the support of the National Science Foundation, implemented the "Curriculum on Research and Experiential Education" (CORE). This poster presentation will show how student engagement can be enhanced through an STEM Learning Community. The poster will describe the STEM Learning Community model used at Johnson C. Smith University. This model includes the freshman STEM experience, second-year STEM problem-based learning activities, and faculty/student research opportunities. The poster will focus on the freshman STEM experience and how it contributes to student retention in the STEM disciplines. Strategies that were used to deliver the STEM curriculum through an interdisciplinary approach will be shown. The integrated and collaborative project design will be shared, including examples of student work. The service learning component of the freshman STEM Learning Community will also be displayed. Academic support programs used in the freshman STEM experience will be addressed, including the STEM Academic Consultant Program. The poster will display the design of the STEM Academic Consultant Program and the implementation of a nationally recognized learning system to promote student engagement both in and out of the classroom. Using the learning system principles, the freshman STEM Learning Community students met weekly one-on-one with a professional from the community (Coordinator of Academic Consultants) to check their progress with the learning system and discuss any academic challenges. In addition, presenters will provide strategies for motivating students to participate in academic support programs. Information will be given on the STEM Learning Community Research Component. Presenters will elaborate on student selection and participation, partnerships with area universities, and student conference travel. Presenters will also share how the STEM Learning Community significantly affected student engagement, retention, and the overall quality of STEM instruction at Johnson C. Smith University.

## 13. Enhancement of Computer Science Curriculum in Information Assurance

*Hira Narang (Professor), Tuskegee University*  
*Chung-Han Chen, Tuskegee University*

With the advent of the Internet, the issue of information assurance (IA) and security has become very crucial. To address this issue, the Department of Computer Science proposed to enhance its curriculum by introducing IA modules into existing courses and developing new IA courses with supporting labs at the undergraduate level. Involvement of faculty and students in IA research, interfacing with other departments for multidisciplinary course development, and involving students in practical information security projects at Tuskegee University's Campus Technology Department are important components of the project. The department has made significant effort to accomplish these objectives. The accomplishments include 1) incorporation of IA modules into the Operating System course (CSCI 0435) and the Computer Networks course (CSCI 0480); 2) development of new IA courses for Computer Science majors: Information Security (CSCI 499E) and Ethical and Social Issues in Computing (CSCI 0481); and development of new multidisciplinary IA courses for non-computer science majors: Introduction to Computer Security (CSCI 0459) and Introduction to Cryptography (CSCI 0533). This effort has been disseminated through IA-related publications. Two successful grants from the National Security Agency will assist in the further development of this

effort, including establishing of an IA track in Computer Science at Tuskegee University. [This work was supported in part by the Tuskegee University National Science Foundation HBCU-UP grant (#0411464).]

#### 14. Development of a Bioengineering Concentration in the Department of Chemical Engineering at Prairie View A&M University: Outcomes and Lessons

*Felcia Nave (Assistant Professor), Prairie View A&M University*  
*Michael Gyamerah, Prairie View A&M University*  
*Irvin Osborne-Lee, Prairie View A&M University*

The engineering profession is currently facing an unprecedented array of external and internal pressures. It is becoming more complex, with traditional disciplinary boundaries blurring or disappearing; thus, graduates in any engineering discipline may find themselves working in emerging fields, e.g., biotechnology and nanotechnology. As a result, graduates are under increasing pressure to have knowledge in these emerging areas. Engineering programs are in the precarious position of adapting to meet the ever-changing needs in order for graduate knowledge to be relevant. Traditionally, the field of chemical engineering has been one of the smaller but versatile branches of engineering. With the emergence of newer technologies, many of which are deeply steeped in chemical engineering principles, the chemical engineering profession has witnessed an increased decline in the number of students choosing it as a field of study. To address this issue, many chemical engineering programs have updated their curricula to reflect the emergence of biotechnology and nanotechnology, as chemical engineering is a natural fit. Student demand has led many universities to add programs at the undergraduate and graduate level. Hence, a number of prominent chemical engineering departments have changed their names and curricula to reflect a shared focus on biology and chemistry, whereas others see fit to maintain their original name and have “bio” concentrations/tracks or offer a biochemical degree within the Chemical Engineering Department. This list contains only one Historically Black College and University (HBCU), Florida A&M University (FAMU). The Department of Chemical Engineering at Prairie View A&M University (PVAMU) is one of only six chemical engineering programs at an HBCU. Of the six, only two programs have updated their curricula to reflect the shared focus on biology and engineering. FAMU, a public institution, has changed its name to the Department of Chemical and Biomedical Engineering, and Tuskegee, a private institution, has added concentrations to its curriculum. With the ever-growing emphasis on the synergy between biology and engineering, it is paramount that PVAMU also updates its program and curricula to remain competitive and be a major contributor to the biotechnology workforce. To this end, increasing the number of bioengineering programs at minority-serving institutions is necessary if members of the science and technology community are to meet the ever-growing needs of the biotechnology and nanotechnology workforce. The objective of the paper is to discuss the outcomes, lessons learned, and the impact of the development of a bioengineering concentration in the department of chemical engineering at PVAMU.

#### 15. The Mathematical Magic of the Fibonacci Numbers

*Stephanie Parker (The Mathematical Magic of the Fibonacci Numbers; MAGEC-STEM National Science Foundation Program)*  
*Mulatu Lemma, Savannah State University*

The Fibonacci numbers are 0, 1, 1, 2, 3, 5, 8, 13, 21, 34.... We add the last two numbers to get the next. The basic relationship defining the Fibonacci numbers is given by  $f(n) = f(n-1) + f(n-2)$ , where we use some combination of the previous numbers (here, the previous two) to find the next. The purpose of this paper is to study properties of Fibonacci numbers and try to contribute more to the theory. We will look at the pattern in the Fibonac-

ci numbers themselves, the Fibonacci numbers in Pascal’s Triangle, using a Fibonacci series to generate right-angled triangles with integer sides based on the Pythagorean theorem. We will also investigate applications of Fibonacci numbers to nature.

#### 16. A Collaborative and Integrated Program in Bioinformatics

*Hong Qin (Assistant Professor), Tuskegee University*  
*Kyle R. Willian, Tuskegee University*

As a component of the Tuskegee University HBCU-UP II grant, we will present our vision of a collaborative and integrated program in Bioinformatics. The program has at its core to develop a 300-level course, Introduction to Bioinformatics, and the development of modules to be used in existing STEM (science, technology, engineering, and mathematics) courses. Another important objective of the program is to introduce undergraduates to research in bioinformatics and, to that end, we propose a research program in comparative genomics that can incorporate both undergraduate and graduate students. In addition, we will also develop workshops on bioinformatics for faculty members, aiming to bring bioinformatics components into their courses and work to interface more with other programs on campus (e.g., the Integrated Biosciences PhD program). [This work was supported in part by the Tuskegee University National Science Foundation HBCU-UP grant (#0411464).]

#### 17. Drake State SPEED-UP STEM Summer Bridge Program

*John Reutter (Principal Investigator/Dean of Instruction)*  
*Joyce Rentz, Drake State*  
*Mattie Davis, Drake State*  
*Mohammed Karim, Alabama A&M*  
*Mostafa Dokhanian, Alabama A&M*  
*Ruth Jones, NASA/Drake State*  
*Linda Burruss, Lee High School/Drake State*

To expand the current enrollment in the science, technology, engineering, and mathematics (STEM) field on campus, the SPEED-UP team (National Science Foundation HBCU-UP grant #0625155) has initiated a Summer Bridge Program to expose high school and nontraditional adult students to educational and career opportunities in the STEM fields. During a 64-hour program, 40 high school students and 10 adult students will take classes in mathematics, physics, biology, and computer science. In addition to class time, students will participate in field trips to local industries, including the Marshall Space Flight Center. As a historically black college, Drake State is particularly adept at recruiting minority students, and this skill is demonstrated in our recruiting process for the Summer Bridge Program. Minorities represent 80% of the students we recruited, and, of these, 63% were women. To aid the recruiting process, Drake State is offering students a stipend of \$8.50 per class hour to attend. With 40 slots, Drake State has received 146 applications from 22 high schools in the Northern Alabama area. The poster presentation our team will make will include the following information:

1. Curriculum and pedagogical modifications to teach the subject matter in a hands-on and fun way.
2. Minority/female recruitment best practices.
3. Summer Bridge publications, websites, and readings.
4. Data collected, evaluation, and use.

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## 18. Blasting Off to a Bright Future: ROCKETS Organic Chemistry

*Albert E. Russell (Assistant Professor), Tuskegee University*

*Pamela M.L. Robinson, Tuskegee University*

*Mohamed Abdalla, Tuskegee University*

*Adriane G. Ludwick, Tuskegee University*

*Kyle R. Willian, Tuskegee University*

*Melissa S. Reeves, Tuskegee University*

ROCKETS (Research in Organic Chemistry Kindling Excellence in Tuskegee Scientists [and Engineers]) is a component of a National Science Foundation-funded Tuskegee University HBCU-UP project (Enhanced Communication and Collaboration Among STEM Disciplines Through Undergraduate Curriculum Development and Research Opportunities). The ROCKETS program is designed to be an intensive introduction into organic chemistry. Twelve students are selected from various science, technology, engineering, and mathematics (STEM) disciplines and are required to have completed two semesters of general chemistry. Students are rigorously engaged in an eight-week curriculum that involves an organic lecture course, an advanced organic laboratory course, and a course that introduces them to the methods and ethical concerns of conducting research. This summer marked the introduction of a community service module that featured ROCKETS students actively promoting scientific understanding to K-8 students through a scientific presentation and an interactive chemistry experiment involving polymers. ROCKETS demonstrates that one can have a diversified approach to teaching organic chemistry via implementation of the integration of teaching, research, and community service (ITRCS) to the organic chemistry curriculum, which is important for scientific, technological, and social reasons. The specific goals of ITRCS are to increase the students' science literacy and increase the students' ability to become intellectually independent, thus creating an engaging experience for women and underrepresented minorities in STEM. Implementation of ITRCS to the organic curriculum is a first at Tuskegee University. ROCKETS also addresses the shortage of African-Americans actively engaging in year-long (12-month) scientific research at the undergraduate level as well as entering graduate school in the STEM majors. [This work was supported in part by the Tuskegee University National Science Foundation HBCU-UP grant (#0411464).]

## 19. Evaluation of Trifolium Rhizobia Strains for Nitrogen Fixation in Clover (*Trifolium sativus*)

*Sahlemedhin Sertsu (Dr.), Bowie State University*

*Desta Beyene, Howard University*

Biological N<sub>2</sub> fixation represents the major source of N input in agricultural soils, including those in arid regions. For economic production of clover, which is a major legume fodder crop, the plant roots have to develop nodules containing infective Rhizobium bacteria during establishment. Host specificity is very important in selecting the appropriate strain for effective inoculation of crops with the current energy crisis and environmental pollution problem. Biological sources of fertilizers, particularly nitrogen, are essential because chemical fertilizers are high energy-consuming products and one of the major pollutants of ground water. This project deals with comparison of the nodulation ability of selected Rhizobial strains on clover. The outcome of the study is expected to help in attaining the goal pertaining to low input sustainable agriculture applicable to the Maryland area. Previous inoculation studies on white clover indicated a sevenfold increase in seedling establishment followed by nearly a fivefold improvement in dry matter production in the following year (Young and Mytton, 1983). In this study, inocula produced from 10 different *Trifolium Rhizobia* strains, obtained from USDA-BARC accessions collected from Maryland (*T. arvense*, *T. aureum*, *T. pratense*) and from South Carolina (*T. incarnatum*, *T. lappaceum*, *T. michelianum*, *T. nigrescens*, *T. repens*), will be compared for their nodulation ability on clover. Inoculated seeds will be grown on

sand and vermiculite mixture in modified Leonard Jars for five weeks under controlled conditions in the greenhouse. Results on nodulation ability and dry matter yield of the Rhizobia strains will be reported (presented on posters) along with recommendations for future studies under field conditions. [This study is being financially supported by the B.T.T.E.R. mini-grant project of the National Science Foundation, through the Department of Computer Science, Bowie State University. Laboratory and greenhouse facilities are availed by USDA-BARC.]

## 20. Development of an Office of Undergraduate Research

*Sharee L. Small (Director of Undergraduate Research), Tuskegee University*

*Melissa S. Reeves, Tuskegee University*

The Office of Undergraduate Research, currently located in Carver Research Foundation's Electronic Classroom, was developed to support student research efforts, both on and off campus with the science, technology, engineering, and, mathematics (STEM) majors. The Office of Undergraduate Research is a tool to be used by the students to increase their awareness of summer research opportunities and to make known the variety of graduate programs that are available to them. Through this office, students are able to find summer and graduate school programs and be assisted with the application process it requires. The office also showcases students by highlighting their achievements and by providing financial assistance to the students to attend research conferences to present their research projects. The office attempts to make it convenient for the students to obtain useful information by providing a website with links to an array of programs and having office hours (Tuesday and Wednesday 1:30 to 4, Thursday and Friday 9:30 to 11) that will fit their schedules, or appointments can be made. The current director is Sharee Small: (334) 727-8007, [smalls@tuskegee.edu](mailto:smalls@tuskegee.edu). The office, established October 2004, was funded for five years by Tuskegee University's National Science Foundation HBCU-UP grant. [This work was supported in part by the Tuskegee University National Science Foundation HBCU-UP grant (#0411464).]

## 21. Best Practices of the HBCU-UP Strengthening Minority Access to Research and Training (SMART) Program

*Mildred R. Smalley, Southern University and A&M College-Baton Rouge*

The HBCU-UP Strengthening Minority Access to Research and Training (SMART) Program, with funding from the National Science Foundation since 1998, operates on the proven thesis that the scope, depth, and quality of undergraduate training have a strong bearing on the desire and ability of an undergraduate student to attend and succeed in graduate school. Following are several notable best practices of the program. Pre-College Outreach: The Pre-College Algebra Course for High School Students (SMART PAC) is an intensive eight-week summer college mathematics course for academically advanced high school students. SMART PAC is designed to 1) challenge students in a college pre-calculus course, exposing them to skills necessary to successfully matriculate as a science, technology, engineering, and mathematics (STEM) major; 2) expose high school mathematics teachers working as "apprentice teachers" to the demands students will face and stimulate them to become more effective teachers; and 3) develop a recruitment pathway to increase the number of incoming freshmen STEM majors who are high achievers in mathematics, the gateway to all STEM disciplines. Undergraduate Research: SMART endeavors to develop scientific and research skills among primarily freshman and sophomore students through participation in an on-campus summer and academic year Research Experiences for Undergraduates (REU) program. Students work on research projects with university faculty research mentors who volunteer their time and receive no monetary salary compensation. This experience assists students in acquiring external



research opportunities and in focusing on their desired specialization in graduate school. Faculty Development: The objective of the STEM Hall of Fame is to inspire SUBR STEM majors to pursue a doctoral degree and become a professor at a historically black college and university. This is an integrated effort with the chancellor to encourage excellence in teaching and research by developing and maintaining a diverse, intellectually vigorous faculty committed to the improvement of undergraduate education. Inductees are announced each year at the Chancellor's Annual Faculty and Staff Recognition Program.

## 22. Multi-Faceted Approaches for STEM Education Quality Improvement

*Subramania I. Sritharan (Professor and Director, ICWRM), Central State University*

*Cadance Lowell, Central State University*

*Mahmoud Abdallah, Central State University*

*Robert Marcus, Central State University*

*Gerald T. Noel, Central State University*

Results from a Historically Black College and University (HBCU) in the Midwest after implementing a multifaceted program for the improvement of science, technology, engineering, and mathematics (STEM) education under the HBCU-UP initiative of the National Science Foundation from 2002 are discussed. The program elements included enhancing student learning processes through peer tutoring and undergraduate research, improving curriculum by updating laboratory equipment, facilitating faculty research, and other related activities. These programmatic activities, affecting students pursuing nine different STEM fields of study, placed higher demands on faculty efforts but provided thematic focus on improving the quality of programs. Central State University, between Fall of 2002 and Fall of 2006, increased its overall student body size from 1,440 to 1,766, reflecting a 22.6% increase. However, the overall enrollment count in STEM areas, as reflected by student registration in the fall enrollment count, increased from the pre-project level of 197 to 250 in 2006 (27%). The STEM first-year retention started dropping from baseline values of 63% in 2001–2002 during the early phases of the project, but started improving after 2006. STEM graduation rates and percentage of students with a GPA greater than 3.0 have been improving. Various correlative factors on student success and impacts of a multifaceted approach are described. The project has resulted in numerous synergistic activities that have enabled improvement in quality of STEM programs at the university.

## 23. The rHDL Drug Delivery System: A Novel Approach for Cancer Chemotherapy

*Grant W. Wangila*

*Andrea Lacko, University of North Texas Health Science Center*

Chemotherapy continues to be a major treatment option for most cancerous tumors. Despite recent successes in single or combination therapy, solubility and toxic side effects remain a serious concern during the intravenous delivery of anti-cancer drugs. This project aims to develop a novel, targeted delivery vehicle with increased efficiency aiming to reduce the toxic side effects of anti-cancer drugs.

Lipoproteins are composed of natural ingredients and thus are not likely to be rapidly removed by the reticulo-endothelial system as foreign material. Cancer cells are likely to have an enhanced expression of lipoprotein receptors, because of their high proliferative rate, and thus the need for excess cholesterol. Procedures for the preparation of reconstituted (artificial) lipoproteins are available, thus permitting eventual large-scale production. We have isolated and characterized proteins using chromatography, electrophoresis, and preparative ultracentrifugation. The rHDL particles have been prepared that contain anti-cancer drugs as core components. Characterized the rHDL/drug complexes to show that they have

the general characteristics of native HDL and showed that the rHDL/drug complexes can deliver anticancer drugs to cancer cells via a receptor-mediated pathway. Our intent is performing studies to establish maximum tolerated dose for suppression of cancerous tumors in mice by the rHDL/paclitaxel formulation.

## 24. The Impact of the Summer Bridge Program on the Success of STEM Majors

*Clytrice Watson (Assistant Professor), Delaware State University*

*Mazen Shahin, Delaware State University*

*Melissa Harrington, Delaware State University*

*Fredrick Hartline, Delaware State University*

The HBCU-UP Summer Bridge Program at Delaware State University is designed to assist students in making a smooth transition from high school to college. The program objectives are to strengthen skills in mathematics, writing, and reading comprehension through college-level courses that are taken for credit, while learning college success strategies. Our students have the opportunity to connect with upper-level STEM students and faculty members with whom they will be interacting during their college career. Students have the opportunity to live on campus for five weeks, thus preparing them for their lives as college students and scholars. Our program offers pre- and post-testing in math, reading, and writing and an attitude survey that allows us to track skill level progress and changes in attitude toward these STEM courses. Additional components of the program include a summer research experience supervised by a faculty mentor. Introducing research activities to the students early in their career helps prepare our students to meet our goal to have them working in a research laboratory by their sophomore year. Our program is in its fourth year, and the first cohort is approaching graduation. The four years of data from the cohort and the main stream of STEM majors will provide insight on the effectiveness of the program in ensuring the success of the participants.

## 25. Explore the Method of Understanding and Modeling Life-Like Facial Interactions with a 3D Animated Virtual Tutor

*Jie Yan (Assistant Professor), Bowie State University*

3D animated characters can enhance the user's experience in several important ways. They bring a remarkable communication instrument—the human face—to the human-computer interface. A vital and growing multidisciplinary community of scientists worldwide is devoting significant efforts to develop and evaluate animated characters that act as virtual humans in various application scenarios. To date, researchers have generated powerful conceptual frameworks, architectures, authoring tools, and systems for representing and controlling behaviors and facial expressions of 3D animated characters to make them believable, personable, and emotional. These behaviors and expressions range from facial emotions, to gestures, gaze, and emotions conveyed in speech. However, how to generate real life-like animation sequences of the 3D animated characters and control these behaviors and expressions, especially emotive expressions automatically, is currently a popular and most challenge area of research in the field. In this work, we hypothesized that a better understanding and modeling of the facial interaction that occurs between real teachers and students will help 3D animated virtual tutors become great teachers. We conduct research to identify behaviors that characterize effective teachers by studying expert reading teachers tutoring students. We collect data and perform experiments to better understand the interaction between real teachers and students and to develop models to improve communication and interaction between the 3D animated virtual tutor and students.

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We develop and evaluate new technologies to enable 3D virtual tutors to behave more realistically, emotionally, and effectively by integrating speech, facial expressions, and other gestures.

## 26. Content-Based Wireless Video Sensor Data Processing

*Bo Yang, Bowie State University*

*Manohar Mareboyana, Bowie State University*

In recent years, sensor networks are becoming popular in providing the ability to share distributed data. Conceptually, a wireless sensor network is a collection of cooperative nodes that communicate with each other using wireless connections to facilitate data processing. One important application for sensor networks is content-based video data processing, which is widely used in battlefield surveillance, habitat/traffic monitoring, environmental and homeland security, eco-systems, etc. In such scenarios, efficient data analysis and fusion methods are necessary to the successful delivery of data. Furthermore, sensor networks have the potential of providing ubiquitously accessible data services. The sensor networks, as expected, could play an important role in improving the quality of service in such applications. In this poster, we introduce a Sensor Network Research Laboratory (SNRL) for training and research in wireless sensor networking. SNRL has a broad range of video sensors, communication devices, and software development capabilities to engage students and faculty. Discrete devices will be available for measuring and monitoring temperature, humidity, motion, and live video among many others. In addition, SNRL allows robotics experimentation and research in mobile, autonomous sensors, and MBS technologies to facilitate communication between and among peer sensors and control stations where the sensor data are stored in a database and used for system decision making. Using the sensor network lab, the following research has been conducted: 1) QoS-based multi-resolution delivery: using multi resolutions of the video/image data to perform content-based data processing with reduced cost and improved accuracy; 2) multi-source data fusion: using statistical modeling of image/video background, the data from various sensors (cameras, temperature sensors, and infra-red sensors) can be fused for anomaly detection; and 3) semantic-aware data caching: using semantic description and the access frequency to resolve queries without incurring flooding in the network.

## 27. Design and Testing of a High-Altitude Payload Capable of Annealing and Quenching of Low Melting Point Alloys

*Makeba Anderson, Central State University*

*Augustus Morris, Central State University*

Payloads on high altitude ballooning missions are subjected to a wide range of temperatures during flight. Typically temperatures range between  $-80^{\circ}\text{C}$  and  $20^{\circ}\text{C}$ . In addition, the air pressure is virtually a vacuum at altitudes of 100,000 ft. This could possibly be a perfect environment for understanding the effect of certain low melting point alloys during extreme quenching in a vacuum. The mission is to design a payload capable of controlling temperature around  $100^{\circ}\text{C}$  without incurring a great energy and mass penalty. A Temperature versus Time profile of three separate cases was studied on a cylindrical payload containing a heating element comprised of four 2-ohm resistors in series. A  $15 \times 15 \times 15$  inch Styrofoam cube was constructed as a test bed. Ten pounds of dry ice was placed inside the cube, creating an ambient temperature of about  $-60^{\circ}\text{C}$ . Time temperature profiles of the payload were conducted under heat generation of 0, 4, and 8 watts. The collected data were compared to theoretical heat transfer models. Future studies include thoroughly ground testing the payload and securing it to a weather balloon for flight-testing. The balloon flight will be tracked and recovered using GPS (global positioning system) and amateur radio technology. The data retrieved from the flight will be compared to a simulated model. Further studies include improved payload design to maintain temperature settings for a specific low melting point alloy.

## 28. Organic Compound Phytoremediation at a Superfund Site

*Jacob Fairbanks, Central State University*

*William Price, Central State University*

*Krishnakumar Nedunuri, Central State University*

*Cadance Lowell, Central State University*

South Dayton Dump and Landfill (SDD) is located in Montgomery County, Ohio. It contains hazardous wastes, such as organic compounds, typically found in diesel fuel, that have contaminated soil and groundwater. The Environmental Protection Agency (EPA) has classified this site as a Superfund site and put it on the National Priorities List for remediation. Phytoremediation is a low-cost method of using plants to degrade, volatilize, or sequester pollutants. Canada Wild Rye (*Elymus canadensis* L.) and Sideoats Grama (*Bouteloua curtipendula* [Michx.] Torr.) grasses were grown in contaminated soil from SDD in a greenhouse to determine if selected organic compound content decreased after phytoremediation. Grasses were grown in five-gallon buckets layered with top and contaminated soil for one growing season (one year). Specific agronomic treatments were added to enhance grass growth, including the addition of municipal compost, commercial fertilizer, and 3-day versus 5-day watering regimes. Initial soil organic compound concentration and composition was determined by Soxhlet extraction with methylene chloride and acetone, and 14 potential organic compound contaminants were identified using Varian Model 2100 T GC/MS. At the end of one growing season, soil cores were taken for analysis using the same extraction and analysis protocol. Seven of the organic compounds persisted in the topsoil control in both Canada Wild Rye and Sideoats Grama. Results indicated that Canada Wild Rye was able to phytoremediate these compounds better than Sideoats Grama, with Sideoats Grama having the presence of 1.7 times more organic compound contaminants than Canada Wild Rye treatments. The addition of municipal compost and a weekly watering regime also improved the phytoremediation of the targeted organic compounds, with both regimes showing the presence of the fewest of these compounds.

## 29. Mathematical and Simulation Modeling Study of a Dynamic Service System: A Comparative Queuing System Evaluation

*Jock Harris, Central State University*

*Abayomi Ajayi-Majebi, Central State University*

Work is reported on the mathematical and simulation modeling of a queuing system performed at Central State University. Waiting lines or queues occur in many situations in real life, affecting the lives of millions of individuals and groups on a daily basis. Excessive delays to customers at drive-through restaurants, airports, highways, tollbooths, and car wash stations are all but a few examples of the effects of the mismatch of time-varying supply and demand for services. Effort directed at studying, quantifying, optimizing, and ameliorating the effects of waiting lines have the potential to provide directions for operational improvements. Quantitative solutions are provided analytically and also by simulation approaches of a specified queuing system. Based on empirical data collected at the restaurant, a simulation model is developed and output results from a study of a fast food restaurant in Xenia, Ohio, are provided. The average system times, average queue lengths, average delays, average service times, worker utilization, etc. (otherwise termed "measures of effectiveness"), are provided based on simulation model results. These statistics provide the basis for rational operational improvement decisions. "What if" analysis can also be performed using the simulation model developed, providing valuable information on alternative strategies contemplated

for implementation. Furthermore, objective assessments of the impact of countermeasures as measured in pecuniary, and other terms can be implemented through the specification of the measures of effectiveness or the queuing system.

### 30. Design, Assembly, and Optimization of Solar Energy on the EZ-GO Golf Cart

Shannon Jones, Central State University  
Abayomi Ajayi-Majebi, Central State University

The objective of this design project is to optimize the output response (distance of travel, charge level) to the input factors (payload, terrain conditions, tire pressure, solar panel on/off condition) for the operation of an executive EZ-GO Car(t) mobile solar charging to the station. Work is being performed on the redesign, assembly, and retrofit with respect to the solarization of the EZ-GO TXT-6 passenger Golf Car(t). The work involves implementing the electrical and mechanical subsystems. The mechanical subsystem design project work involves designing the support structure for the solar panels and integrating this with the existing structure and installation of the digital speedometer, which provides statistics on travel distance, average speed, and elapsed time. The electrical subsystem work involves connection of the solar panels through a charge controller to the 48-V serialized battery array. Energy use and loss accounting was performed. A heavy-duty SABRE battery analyzer was purchased in support of the project. The optimization study results would be useful to professional golfers and amateurs who would like to extend the range of their golf carts by use of onboard mobile solar panels to deliver solar energy and augment the energy stored in the eight 6-V batteries. The National Nuclear Security Administration (NNSA) is sponsoring this project.

### 31. Solar Neutrinos (The Energy Production in Our Sun)

Tigisti Kesete, Central State University  
Suzanne Seleem, Central State University

The last decade has seen huge progress in the study of neutrinos, which are elementary subatomic particles. Continued growth in neutrino research depends on the calculation of the neutrino mixing angle  $\theta_{13}$ , a fundamental neutrino parameter that is needed as an indicative guideline for proposed next-generation neutrino experiments. Experiments involving reactor antineutrinos are favored for the calculation of  $\theta_{13}$  because their derivation equation for  $\theta_{13}$  is relatively simple and unambiguous. A Gd-loaded liquid scintillator (Gd-LS) is the centerpiece of the detector and it consists of ~99% aromatic solvent, ~0.1% Gd, and ~1% fluors. Key required characteristics of the Gd-LS are long-term chemical stability, high optical transparency, and high photon production by the scintillator. This research focused on two important aspects of the detector: 1) purification of two selected scintillation solvents, 1, 2, 4-trimethylbenzene (PC) and linear alkyl benzene (LAB), to improve the optical transparency and long-term chemical stability of the Gd-LS; and 2) investigation of added fluors to optimize photon production. Vacuum distillation and column separation were used to purify PC and LAB, respectively. Purification was monitored using ultraviolet-visible absorption spectra and verified in terms of decreased solvent absorption at 430 nm. Absorption in PC at 430 nm decreased by a factor of ~5, while the absorption in LAB was lowered by a factor slightly  $\rightarrow 10$ . Photon production for every possible combination of two solvents, four primary shifters, and two secondary shifters was determined by measuring the Compton-Scattering excitation induced by an external Cs-137 gamma source (Eg ~ 662-keV). The ideal shifter concentration was identified by measuring photon production as a function of shifter quantity in a series of samples. Results indicate that 6 g/L p-terphenyl with 150 mg/L 1,4-bis(2-methylstyryl)-benzene (bis-MSB) produces the maximum light yield for PC, and 6 g/L 2-(4-biphenyl)-5-(4-tert-butylphenyl)-1,3,4-oxadiazole with 50 mg/L bis-MSB optimizes the light yield for LAB. Future work should focus on obtaining the fluorescence spectra

for each of the shifters and studying the optical transparency of the LS as a function of shifter quantity.

### 32. Role of Microbes in Degradation of Petroleum Hydrocarbon Contaminated Soils Using Native Grasses

Wilbert Meade, Central State University  
Krishnakumar Nedunuri, Central State University  
Cadance Lowell, Central State University  
Jodi Shann, University of Cincinnati

This research was aimed at determining optimal agronomic practices for cleanup of industrial petroleum hydrocarbons using Ohio grass species. Canada Wild Rye, Prairie Brome, Indian Wood Oats, Indian grass, Sideoats Grama, and Switch grass were placed in layered soil in five-gallon buckets with contaminated soil from a local industrial site and grown in a greenhouse for over five months. Each species was subjected to three soil amendments (compost, fertilizer, compost plus fertilizer, with topsoil control) and watered frequently (fourth day) or less frequently (sixth day). Soil cores were removed for total petroleum hydrocarbons (TPH) analysis, Soxhlet extracted, and analyzed by GC/MS. Initial concentration of TPH in contaminated soil was 4,100 ppm. Maximum reductions in TPH concentrations were observed in compost with Sideoats Grama (8 ppm) and compost plus fertilizer with Canada Wild Rye (16 ppm). TPH concentrations for these species in topsoil were 307 and 187 ppm, respectively. Both grasses exhibited extensive growth in above- and belowground biomass with compost. The control had a TPH concentration of 395 ppm. The rhizosphere of these species supported significant numbers of petroleum hydrocarbon degraders. Bacteria present were counted from Canada Wild Rye and Sideoats Grama treatments using plate counts. Their ability to degrade some common petroleum contaminants such as diesel fuel and phenanthrene was tested. Molecular diversity of microbial consortium was determined using a 16S rRNA amplification procedure and analyzed using PCR and DGGE. The causative factor for this degradation was essentially rhizosphere degradation. Results of microbial degradation will be discussed.

### 33. Ribotyping Polyaromatic Hydrocarbon (PAH)-Degrading Pseudomonads and Cosmid Library Screening for Dioxygenases

Talmage Miller, Central State University  
Anthony R. Arment, Central State University

Polyaromatic hydrocarbons (PAHs) are ubiquitous environmental contaminants found in soil, water, and air. PAHs originate from the processing and burning of fossil fuels. There are an estimated 112,000 sites in the U.S. polluted with PAHs. The most commonly identified soil bacteria degraders are pseudomonads. This work entails the identification of four previously identified degraders to genus and species by the process of ribotyping and the isolation of PAH-dioxygenases from a cosmid expression library prepared in *E. coli*. Ribotyping was accomplished by polymerase chain reaction (PCR) using primers targeting the 16S subunit (Greison et al., 1994). Fluorescently labeled primers were made to accommodate sequencing on CSU's LI-COR 4300 sequencer. Sequence data was run against a DNA database (Genbank) to identify strains 18G, 19SB, 32SP, and 57RV all as *Pseudomonas aeruginosa*. Total DNA from all four strains were isolated and used to generate SuperCos cosmid libraries (Stratagene, La Jolla, CA) (Arment, prior research). Aliquots of each library were diluted in LB broth and plated onto LBA100 plates overnight. Each plate was then seeded with indole crystals in the lid and sealed with parafilm. Indole is an aromatic hydrocarbon that can be cleaved by an active dioxygenase enzyme; the resulting intermediate is unstable and converts to indigo, thus, turning the colonies blue. Ampicillin-resistant blue colonies were selected from each library and confirmed as positives by the following methods: 1) amplification of a dioxygenase gene fragment by PCR and 2) growth in liquid

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culture with naphthalene (PAH) as the sole carbon source. Next steps in the research are 1) to use GC-MS to monitor the consumption of PAHs over time and the possible appearance of by-products and 2) isolation and restriction mapping of positive cosmid clones followed by subcloning and sequencing of the PAH-degrading genes.

## **34. Heat Topology Analysis of a Scalability Parallel Algorithm for Simulating the Control of Steady-State Heat Flow Through a Metal Sheet**

*Maurice Thomas, Central State University*

*Billy Jones, Central State University*

*Robert L. Marcus, Central State University*

The objective of this research project is to determine the heat topologies of a scalable parallel algorithm that simulates the control of steady-state heat flow through a metal sheet. The algorithm simulates a square metal sheet with the initial conditions of heat of 100 degrees applied to some edges and an ice bath of 0 degrees applied to the other edges. The program performs these simulations using a parallel row-wise decomposition method with grid sizes of 200 x 200 and higher applied to the metal sheet. Various numbers of compute nodes were used to determine speed-up and scalability of the algorithm. The problem was to track the temperature of the middle cell of the sheet under changing heat settings of the edges and display the heat topologies of the sheet for these settings using MATLAB surface plots.

## **35. Development and Fabrication of a Loop Heat Pipe Prototype**

*Keith Jackson, Central State University*

*Kristyna Cummins, Central State University*

*Morris Girgis, Central State University*

Loop heat pipes (LHPs) are two-phase heat transfer devices with capillary pumping of a working fluid. The LHPs are capable of transferring heat efficiently for distances up to several meters at any orientation in the gravity field. The focus of this research was to develop and fabricate a unique prototype of a flat-evaporator LHP that enables studying a wide variety of different concepts for the wick structure. Two types of the wick structure were developed: the screen wick structure and the sintered wick structure. The screen wick loop heat pipe was manufactured and assembled. The sintered wick structure is being manufactured with the same overall dimensions (1" x 6" x 1") for the sintered wick structure. A filling station for dispensing filling in an exact amount of the working fluid into the loop heat pipe was fabricated and assembled. A stainless steel mold was fabricated for the sintering of the copper wick structure. The mold will be pre-heated to 600°C in an oxidizing atmosphere. Then the copper powder will be poured into the mold and then heated once again in an N<sub>2</sub> atmosphere to avoid oxidization of the copper wick structure. Parameters controlling the performance of the LHP include the wick wall thickness, the groove size, the sintered wick pore radius, and the permeability. Upon completing the experimental setup, a series of experiments with varying heat input (up to 1 KW) to the evaporator will be conducted for both the screen wick LHP and the sintered wick LHP. The research is still in progress.

## **36. Characterization of Polymer Composites for Improved Fabrication of a Steel-Toed Boot**

*Charlita Lawrence, Central State University*

*Alessandro Rengan, Central State University*

*William Price, Central State University*

Polymer composites are increasingly being used in today's world for many applications requiring high strength and a light weight; examples are aircraft, automobiles, and bridges. We have several polymers for use as an alternative to steel in heavy work boots. Two thermoanalytical techniques used are thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC). TGA was used to investigate thermal stability and decomposition temperature of the polymer, as well as glass fiber content. DSC is the calorimetry method that measures heat flow into the sample during structural transformations in the polymer. One of the most important effects measured with DSC is the glass transition temperature, T<sub>g</sub>. The DSC measures heat flow into the sample, which becomes more endothermic during the transition from glass to rubber. This is due to an increase in specific heat capacity. TGA and DSC data for polycarbonate, polyamide, and acrylonitrile-butadiene-styrene are discussed. The data were reduced to give quantitative results on glass fiber content and the endothermic enthalpy values.

## Student Poster Abstracts

### Student Poster Presentation Session I

Friday, October 5, 2007 (9:45 am –11:45 am)  
Independence B & C

#### BIOLOGICAL SCIENCES

##### 1. Cloning and In Situ Hybridization of Serotonin Gated Ion Channel from Snail Brains

Sohrab Amiri, Delaware State University  
Melissa A. Harrington, Delaware State University

Scientists have studied cell signaling for many years to understand the functions and reactions of a cell after receiving an input. In this project, we proposed cloning a serotonin gated ion channel thought to be involved in signal processing in the snail. We will, in the future, use in situ hybridization (ISH) to locate the mRNA of the channel in the cell and use RNA interference to evaluate serotonin's role in signal processing. Cloning the serotonin gated ion channel will allow us to identify 5HT-responsive cells and manipulate gene expression.

##### 2. Analysis of Genes Adjacent to Intergenic Regions Chosen for Tf1 Integration, in Fission Yeast

Porsha E. Andrews, Winston-Salem State University  
Teresa L. Singleton, Winston-Salem State University

Retrotransposons are viral agents that replicate via an RNA intermediate and insert within its host genome. The successful integration of retrotransposons depends on the critical balance between the fitness of the host and the ability of the retrotransposon to insert and not affect essential neighboring genes. One method retrotransposons may use to avoid the disruption of essential neighboring genes is to target integration into intergenic regions. We have explored the interaction between the LTR-retrotransposon Tf1 and the genome of the fission yeast *Schizosaccharomyces pombe* using techniques designed to isolate and characterize insertion events of Tf1 throughout the genome of *S. pombe*. We found that Tf1 was significantly more likely to insert near regions that include RNA pol II promoters. We are investigating the effect of Tf1 integration on neighboring genes. Using Northern blot analysis, we were able to detect the in vivo effect of Tf1 insertion on neighboring genes.

##### 3. Role of c-kit Receptor and Stem Cell Factor Ligand in Prostate Cancer Proliferation and Metastasis

James Barton, Morehouse College  
LaTonia D. Taliaferro-Smith, Clark Atlanta University  
Shanti Oyenuga, Clark Atlanta University  
Anais Parker, Spelman College  
Simeon King, Morehouse College  
James Barton, Morehouse College  
Soma Sannigrahi, Clark Atlanta University  
Myron N.V. Williams, Clark Atlanta University  
Shafiq A. Khan, Clark Atlanta University

Advanced-stage prostate cancers are usually androgen insensitive and frequently metastasize to the bone. Tumor proliferation and metastasis can be influenced by various interactions with local and distal microenvironments. Growth factors and their receptors may be involved in the growth and migration of prostate carcinoma cells. The receptor tyrosine

kinase c-kit and its cognate ligand, stem-cell factor (SCF), is one of many ligand-receptor systems that are known to exert multiple effects on cell survival, proliferation, and migration, particularly in the bone. We examined a panel of human prostate cell lines, RWPE-1, RWPE-2, DU-145, LNCaP, PC3, and PC3M, for the expression of the c-kit and its endogenous ligand, SCF, using reverse transcriptase-polymerase chain reaction (RT-PCR), quantitative real-time PCR (qRT-PCR), and immunoblotting methods. We further examined the functional effects of SCF on LNCaP cell proliferation and apoptosis using standard MTT and TUNEL assays, respectively. RWPE-1, RWPE-2, DU-145, LNCaP, PC3, and PC3M prostate cell lines all expressed mRNA transcripts for both the SCF ligand and the receptor c-kit, as determined by RT-PCR and quantitative RT-PCR. Western blot analyses also showed that all cell lines expressed the full-length KIT protein. Surprisingly, in several prostate cancer cell lines examined, we also detected an ~37-kDa band in KIT-specific Western blots, consistent with the presence of a truncated form of the c-kit receptor (tr-kit) and previously observed only in murine testis. Treatment of DU145, LNCaP, and PC3M cells with SCF resulted in a significant increase in proliferation as determined by cell viability assays, which indicates that the receptor is functional and the system is growth stimulatory in prostate cancer. These data show that c-kit and SCF are a common feature in prostate cancer cells and suggest that SCF may play a role in a system of autocrine and/or paracrine loops, mediated by c-kit, which alter prostate cancer cell proliferation by rendering the tumor cells free of stromal-dependent secretion of growth factors that are necessary for normal prostate epithelial cell proliferation and metastasis.

##### 4. Quantification of Maternal Care in Neonatally Stressed Mice and Their Littermate Controls

Kiauna Bradshaw, Morgan State University  
Christine Hohmann, Morgan State University  
Amber Hodges, Morgan State University

Early life experiences affect stress responsiveness and cognitive abilities in adulthood. Positive neonatal experiences enhance cognition and decrease HPA stress reactivity. Negative neonatal experiences, such as decreased maternal grooming, impair cognition and increase HPA stress reactivity in adulthood (2). Our laboratory has developed a model using Balb/Cbyj mice to test the effects of neonatal temperature/maternal separation stress on both cortical morphology and cognitive behavior. Between postnatal days 2–7, half of the litters, without stress exposure, were also used (AMC). Previous data show that STR mice have impaired cognition compared with AMCs, but so do the LMC. We hypothesize that the cognitive alterations seen in LMC may be due to variations in maternal care. We have developed a paradigm to quantify the frequency of licking, grooming, nursing, and nesting, and the other maternal litter is exposed, for 1 hour daily, to temperature maternal separation stress (STR), while littermates remain with the dam (LMC). Preliminary data suggest increased licking and grooming of the STR by the dam, indicating that changes in LMC may be the result of decreased maternal care.

##### 5. The Mitotic Spindle, Kip-1, and Interpolar Microtubules

Collette Brown, Johnson C. Smith University  
Leocadia Paliulus, Johnson C. Smith University

The detailed function of interpolar microtubules during mitosis and the exact location of the motor proteins on interpolar microtubules have yet to be determined. One suspected role for interpolar microtubules is that they carry motor proteins that have a fundamental function involved in creating the mitotic spindle. Kip1 is a motor protein that binds to microtubules during mitosis. We researched the role of Kip1 and its interaction with interpolar microtubules in mitosis. A KIP1-GFP template was amplified by polymerase chain reaction and used in a yeast transformation to

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determine where the KIP1-GFP was located during mitosis. The cells were placed in the medium YC COMP + Gal, in which they are unable to undergo DNA replication. This is because this medium stops the cells from producing the protein needed to replicate. This left only the interpolar microtubules maintaining the mitotic spindle and allowed me to see where Kip1 was on the microtubules. The microscopy data indicated that Kip1 was present on the interpolar microtubules and the spindle did not remain consistent. With the motor proteins successfully highlighted and found on the interpolar microtubules, we will be able to see how interpolar microtubules and the motor proteins build and maintain the mitotic spindle during the M phase. The results suggest that during mitosis, Kip1 located on the interpolar microtubules helps build and maintain the mitotic spindle.

## 6. Phylogenetic Comparison of Three Trypanosoma Species Using Genomic DNA Sequences

*Koshonna Brown, Howard University*

*Karen E. Nelson, Howard University*

It is estimated that 75% of infectious diseases in humans are zoonotic or vector-borne; they appear from microorganisms that infect other animals first or are transmitted from one vertebrate to another through an insect vector. In an attempt to further understand the parasite-vector-host relationship of the protozoan parasite *Trypanosoma*, the phylogenetic relationship between three species was analyzed. The inoculation of a mouse was used to generate *Trypanosoma musculi* genomic DNA. Using genomic sequences of the small subunit ribosomal RNA gene of *Trypanosoma musculi*, *Trypanosoma cruzi*, and *Trypanosoma brucei*, the nucleotide base sequences showed a significant percentage of divergence between the three. Further assessment will lead to more concrete understanding of the evolutionary history of the microbe and its varying degrees of pathogenesis.

## 7. A Comparative Analysis of Environmental Factors Affecting Fecal Coliform and *Escherichia coli* 0157:H7 Strain Concentrations of Virginia Beach, VA and Ocracoke Island, NC Coastal Waters

*Bianca Canady, Norfolk State University*

*Maureen Scott, Norfolk State University*

This investigation is a comparative analysis of environmental factors that promote *Escherichia coli* 0157:H7 and fecal coliform bacteria growth of Virginia Beach, VA, and Ocracoke Island, NC. The factors evaluated in this research are pH, salinity, nitrate nitrogen, storm drainage systems, water temperature, precipitation, *E. coli* and fecal coliform levels. Fecal coliforms are good indicators of water quality.

Fecal coliforms are spread by direct fecal excrement of humans, wildlife, livestock, direct waste discharge, precipitation, agricultural, and sewage runoff. The most common fecal coliform is *Escherichia coli*, commonly referred to as *E. coli*. The majority of beach closings in the U.S are caused by elevated levels of *E. coli*. *E. coli* is a naturally occurring, gram-negative, rod shaped, non-spore forming bacteria. *Escherichia coli* strain 0157:H7 is commonly found in the intestinal tracts of mammals. Although most strains are harmless, this strain produces a powerful toxin which can cause severe illness. This strain is resistant to all antibiotics.

This study examines coastal water samples of 100 mL collected from June 4, 2006 to July 10, 2006 and filtered by using a Membrane Filtration Test. The bacteria colonies were then counted using a Dark Field Colony Counter. Water tests were then performed to analyze pH, salinity, and nitrate nitrogen.

All samples were at the optimum pH and water temperature range for growth for all collection dates at both beaches. Virginia Beach, VA, and Ocracoke Island, NC have different coastal community developments;

high levels of fecal coliform and *E. coli* were present at both locations. Storm drainage systems, precipitation, and increased water temperatures were all contributing factors for high levels of fecal coliform and *E. coli* growth at both beaches for this study. In Virginia, North Carolina, and at the Environmental Protection Agency, water quality standards for marine recreational waters are 200 fecal coliform colonies/ 100 mL of ocean water. All samples collected in this study exceeded these standards. Many water samples exceeded the Environmental Protection Agency standard of 519 colonies per 100 mL of ocean water for *E. coli* 0157:H7.3 Regular monitoring of beaches will insure the safety and health of patrons and marine life. Experiments performed under a National Science Foundation Grant (0355378).

## 8. A Novel Approach to Study Angiogenesis and Angioadaptation

*Sophia Campbell, Savannah State University*

*Christopher Quick, Texas A&M University*

*Ketaki Desai, Texas A&M University*

Angiogenesis, the growth of new vessels, and angioadaptation, the remodeling of existing vessels, are the primary means by which tissues respond to decreased blood flow. While this process is desired when providing blood supplies to repair injury, it may, at the same time, provide the blood supply necessary for the growth of tumors. The effect of mechanical forces such as endothelial shear stress and blood pressure on angiogenesis and angioadaptation has not been studied extensively in the microvasculature because of the inherent difficulties posed by common animal models. Our study will investigate ways to introduce permanent occlusions into the blood vessels imitating the conditions similar to those of a tumor, i.e., increased need for blood perfusion, to study the process of adaptation in the microvasculature. To provide an animal model to study angioadaptation and angiogenesis, we developed an unanesthetized, un-traumatized bat wing model. The bat wing is thin (~35 µm), permitting the insertion of permanent arterial occlusions and the means to observe and record the resulting changes in vessel diameters and blood flows in vivo. Clipping a small hole in the wing or tying of the vessel with a suture is a couple of methods currently used to occlude larger vessels. However, there are no existing methods being used to occlude microvessels. Hence, we developed our own method, by injecting superglue into the vessel using a microinjection system. The bat wing allows for repeated observation of the wing over a period of time, and the changes can be tracked using custom tracking software. With the use of mathematical modeling, we will be able to predict where new vessels will grow. Using an experimental and modeling approach, we expect to be able to predict the mechanism behind angiogenesis and angioadaptation and hence its relevance to clinical applications.

## 9. A Comparative Analysis of Environmental Factors Affecting Biological Properties of the Expandable Alloscutum of the Female Ixodid Tick: *Dermacentor variabilis* Say

*Latrina Childs, LeMoyne-Owen College*

*Sabita Majumdar, LeMoyne-Owen College*

This study is to understand the biological properties of *Dermacentor variabilis* Say. The aim is to characterize the soluble cuticular proteins in the alloscutum in three stages of feeding. The cuticles were collected from each group. In the feeding stage, it becomes fully expanded; in the ovipositing stage, it had contracted and was almost transparent. We have been able to identify proteins by 1D SDS-PAGE analysis that was specific for the partially fed and fully fed when compared with the unfed cuticle. Since trace metals are critical for normal integumentary development and maintenance, the following metals were estimated by the atomic absorption spectrophotometer (AAS): (Fe), (Mg), (Cu), (Cd), (Ca), and (Zn). An

increase of iron, zinc, and calcium in the cuticles of the partially fed ticks was observed when compared to the unfed ticks. The cadmium content increased in the cuticles of both partially fed and fully fed ticks compared to the unfed ticks.

## 10. No Differences in DNA sequences from Two Color Morphs of the Mustard Hill Coral, *Porites astreoides*

*Tryphena Cuffy, University of the Virgin Islands*  
*Sandra L. Romano, University of the Virgin Islands*

The evolutionary process helps with clarifying species boundaries and aids in the development and understanding of our surroundings. Systematics of scleractinian reef corals (defined by morphological differences) have proven to be controversial. The genus *Porites* is found abundantly in the Caribbean and many Pacific islands. The genus is speciose, but for many of these species, there is doubt as to whether they are in fact separate species. This is problematic because of inter- and intraspecific variation within the genus *Porites*. Much research has been done, but it has been difficult to establish a basis of distinction for species within the genus. *Porites astreoides*, a massive coral, is found as two color morphs in the Caribbean—green and brown. The genetic similarity between the two morphs has proven to be elusive to scientists because of morphological evidence that supports the hypothesis that they are genetically similar as well as evidence that opposes it. By comparing DNA sequences, I determined the genetic similarity of the two *P. astreoides* morphs to test the hypothesis that the two morphs are a variation of one species and the alternative hypothesis that the two morphs are genetically different from each other. Samples were collected from colonies in St. Thomas, United States Virgin Islands. Genomic DNA, including nuclear and mitochondrial DNA, was extracted from samples of both green and brown morphs of *P. astreoides* for polymerase chain reaction (PCR) amplification of two mitochondrial gene regions. PCR products were cycle sequenced and electrophoresed on an automatic sequencer. Sequences were analyzed, aligned, and edited using Sequencher<sup>®</sup>. There were no differences in nucleotide sequences between any of the samples. These results thus far do not support the hypothesis that the two different morphs are genetically distinct from each other. Continuing work on this project includes more samples of *P. astreoides* and analyses of nuclear DNA sequences to more comprehensively test the hypotheses that the two morphs of *Porites astreoides* are genetically distinct and that the species *Porites branneri* (distinct in morphology and bluish in color) is synonymous to *Porites astreoides*.

## 11. Streptozotocin-Induced Type 1 Diabetes–Mediated Reduction in Intrinsic Heart Rate of Murine Model (Mice)

*Modupeoluwa Durojaiye, Bennett College for Women*  
*Auyon Mukharji, Williams College*  
*Mack Brickley, Williams College*  
*Steven J. Swoap, Williams College*

**BACKGROUND:** Previous research showed a fall in heart rate of type 1-induced diabetic mice. The purpose of the research was to see if the fall in heart rate was due to a decrease in intrinsic heart rate. Type 1 diabetes occurs when the body loses its ability to produce insulin. Intrinsic heart rate is the autonomically unregulated heart rate that results when Metoprolol and Atropine is injected and thus blocks the autonomic regulation of the heart rate. **HYPOTHESIS:** The fall in heart rate of type 1 diabetic mice is not mediated by the autonomic nervous system (sympathetic and parasympathetic) and thus will be mediated by a fall in intrinsic heart rate. **METHODS:** Mice were surgically implanted with DSI EKG telemeters that were used to measure the heart rate, activity rate, and body temperature. A software program was installed on the computer that could collect data from these telemeters. Mice were allowed to recover for at least 7 days after the telemeters were surgically implanted before the study began.

Mice were housed one per cage at 25°C and fed “buffet style” with normal mouse biscuits. Body weights and water bottle weights were measured daily. Six of twelve mice were randomly picked for streptozotocin (STZ) injection, and the other six served as controls. Blood samples were drawn for the glucose assay test by cutting the tip of the mouse tails. Metoprolol and Atropine injections were used to test intrinsic heart rate. **RESULTS:** After an initial and fruitless attempt at inducing diabetes with STZ dissolved in water, we later successfully induced diabetes in our mice by injecting them with STZ that was dissolved in dilute sodium citrate solution. After a few days, we noticed that the mice that were injected drank more water and ate more food than the controls, as their metabolism needed to compensate for both the low levels of stored glucose as well as the increased amount of glucose in their blood that has been urinated directly. A glucose assay test was also conducted on their blood plasma sample. The injected mice had a higher blood glucose concentration than the controls (since insulin was not being produced by the beta cells of the pancreas and thus a higher blood glucose concentration in their blood). We saw a relatively low heart rate in our diabetic mice than we had expected to see. We had hoped to see a lower intrinsic heart rate in our diabetic mice. We compared their intrinsic heart rate before and after they were injected, but there was not much difference than we had expected. **CONCLUSION:** The fall in heart rate of type 1 diabetic mice may not be due to a decrease in intrinsic heart rate. The experiment will be repeated to determine if our hypothesis is correct. [This project was supported by Howard Hughes Medical Institute (HHMI)].

## 12. Isolation and Identification of Photobacterium from Fish and Shrimp

*Takena Gross, LeMoyne-Owen College*  
*Mickie Woodall, LeMoyne-Owen College*  
*Rhonda J. Kuykindoll, LeMoyne-Owen College*

Photobacterium of the genus *Vibrio* are gram-negative curved rods that are natural inhabitants of the marine environment. *Vibrio* infections cause three major illnesses: gastroenteritis, wound infections, and septicemia. Many of the infections are food borne and are associated with consumption of raw or undercooked fish and shellfish. Luciferase is the enzyme involved in the biological production of light or bioluminescence. Bioluminescence only occurs when photobacteria are at high cell densities in a communication process called quorum sensing. Quorum sensing enables bacteria to communicate using secreted signaling molecules called auto-inducers, which belong to a group of microbial hormones that are found to be specific acylated derivatives of homoserine lactone (N-3-oxo-hexanoyl-L-homoserine lactone, designated as AHLs). The lux operon found in *Vibrio fischeri* contains a group of five genes (*luxCDABE*) that are required for biological light production. The genes have been cloned in *E. coli* and are on a recombinant plasmid designated pVIB. The purpose of our research is to isolate and identify photobacterium from Indonesian shrimp to identify novel lux genes that may be involved in bioluminescence and quorum sensing. Shrimp were de-veined and the shell was removed, and approximately 1.5-cm sections were cut and placed into six-well tissue culture plates. Sections were flooded with saline solution and were incubated for 24–48 hours at 18°C and 24°C. Luminescent bacterial colonies were observed after 24 hours of incubation. Colonies were selected and streaked onto photobacterium agar plates to further isolate pure colonies. Luminescent colonies were selected and inoculated into photobacterium broth to prepare whole cell lysate and SDS-polyacrylamide gel electrophoresis. Luminescent colonies were also selected for genomic DNA purification. Purified genomic DNA will be used for restriction enzyme digestions and isolation and identification of novel lux genes.

# Abstracts

## 13. Studies on the Growth Curve of the HU Bio-II Strain of *Bacillus mojavensis* and Probable Correlation with Peak Development or Accumulation of Antifungal Components

Venita Hall, Howard University

Lafayette Frederick, Howard University

A strain of bacterium, designated as HU Bio-II, and tentatively identified as a strain of *Bacillus mojavensis*, has been found to form substances with strong antifungal properties. Nothing is known about the growth curve of this strain and whether or not a correlation exists between the growth curve and time of maximum formation or accumulation of the antifungal component. This study is being conducted to obtain information on these matters. Procedures followed in this study include the flask culture of the bacterium in potato-dextrose broth under shake conditions; the determination of culture medium absorbance, pH, and colony count at seven intervals over a 14-day period; the collection and sterilization by filtration of the broth from culture flasks representing each experimental period; and the bioassay of filtrates for antifungal properties using *Neurospora lineolata* as the test fungus. Preliminary data on the growth curve of the bacterium have been obtained. Results from preliminary bioassay experiments suggest that a probable gradient exists in the production of the antifungal components during the 14-day period. For the time being, it is unclear as to whether a correlation exists between the growth curve of this strain of bacteria and the production or accumulation of its antifungal properties.

## 14. Red Form of *Echinometra lucunter* Shelter from Sunlight More than Other Chromatic Forms

Fitzherbert Harry, University of the Virgin Islands

Steve Ratchford, University of the Virgin Islands

Ultraviolet light is a growing concern in the world today because of the depletion of the ozone layer. Little research has been done on the effects of ultraviolet light on marine life. *Echinometra lucunter* (the rock-boring urchin) are found in the shallows, where they are exposed to sunlight. They come in three chromatic forms: black, red, and a mixed red/black form. We investigated if there was a difference in the sensitivity to ultraviolet light among the three chromatic forms. We performed two 50-m<sup>2</sup> transects and two 30-min timed swims at four sites around St. Thomas, during which we counted urchins of the three color forms exposed to sunlight versus the ones found under rocks. We used a chi-squared contingency test to determine if any of the color forms were more likely to be found under rocks. A greater percentage of the red urchins than black or mixed urchins was found under rocks. Is this distribution caused by red urchins using rocks to shade them from the sun more than the black urchins do? We constructed four shallow wet-tables with flowing water and small shelters—two tables in sunlight and two in a shaded lab. We placed 10 urchins haphazardly in each of four tables. One table in the sun and one in the shade got red urchins; the other two got black urchins. After three days, we recorded the number of urchins found under shelters. We conducted six replicates of these four treatments. We analyzed the data using t-tests to determine if one color form was more likely to be found under the shelters. Both color forms were more likely to use the shelters in direct sun than in the shaded treatments. Although we have not seen any difference between red and black urchins seeking shelter in the sunlight treatment to date, in the shaded treatment, red urchins were likely to be found under shelters than black urchins. If urchins are seeking shelter in rocks to avoid ultraviolet damage, then the black pigment may provide more protection from damaging ultraviolet rays than the red pigment.

## 15. Location Proteomics: Using Shape Signatures for Classification

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Alexia Mintos, University of the Virgin Islands

Robert Stolz, University of the Virgin Islands

The primary goal of “Location Proteomics” is to automate protein classification through the development of numerical features that can help to identify and differentiate between protein images. The images used are fluorescence microscope images of protein location patterns within cultured cells. These images were obtained from the Murphy Lab at Carnegie Mellon University. It is believed that the proteins can be classified by their shape signatures and that proteins in the same class would have similar shape signatures. This work involves developing new sets of geometric features that can find dissimilarities between two- and three-dimensional images by creating shape signatures for each protein image. These signatures are derived from shape distributions and probability distributions derived from samples of geometric measures between random points on the images. After these distributions are obtained, we use different norms to quantify the dissimilarities. Before the images are analyzed, they are converted to binary images and preprocessed to remove excess background noise and to define clear boundaries. After preprocessing, a shape distribution is found by calculating the Euclidean distances between random points in the image and constructing a normalized histogram. The shape distributions of different images are compared using the L-2 norm. Our study focuses on comparing our algorithm’s performance using different geometric measures and norms.

## CHEMISTRY & CHEMICAL SCIENCES

## 16. Synthesis and Characterization of an Alpha Acyloxy C-Nitroso Compound as an HNO Donor

Emma Annan, Winston-Salem State University

Mamudu Yakubu, Winston-Salem State University

Nitroxyl (HNO/NO<sup>-</sup>) is the one electron reduced form of nitric oxide (NO). Like NO, HNO is involved in vasorelaxation. Comparisons of NO and HNO donors in nonvasoactive assays have demonstrated that the physiological properties of these two nitrogen oxides are discrete. Nitroxyl is implicated in the treatments of heart failures and alcoholism. Several nitroxyl-donating compounds have been reported. However, their use as biochemical tools is limited. Recent literature has shown that C-nitroso compounds are capable of releasing HNO. We report here the synthesis and characterization of N-acyl-N-(2-acyloxy-3,3-dimethyl-2-nitrosobutyl)-2-methoxyethylamine as evidenced by the <sup>1</sup>H and <sup>13</sup>C NMR spectra of the intermediates and final reaction product.

## 17. Synthesis and Photophysical Characterization of Schiff Bases as Anion Sensors

Belygona Barare, Morgan State University

Dr. Yousef Hijji (Mentor), Morgan State University

A series of salicylaldehydes were synthesized from condensation of salicylaldehyde and aryl amines without solvent under irradiation from a conventional microwave. The microwave-mediated condensation allowed for the synthesis of Schiff bases in good to excellent overall yields in short reaction times. The Schiff bases were purified by recrystallization and confirmed by <sup>1</sup>H<sub>NMR</sub>, <sup>13</sup>C<sub>NMR</sub>, IR, GC-MS, and X-ray crystallography. The Schiff bases were studied as anion binding sensors. These sensors were comprised of two parts; one is the anion binding part, which is based on amine and phenol moieties. The other is a conjugated chromophore, which converts binding-induced changes into an optical signal, such as



naked eye intensive change in color to generate strong colorimetric signals in the presence of inorganic anions. Substantial bathochromic shift and well-defined color change in the visible region of the spectrum was observed upon addition of fluoride, dihydrogenphosphate, and acetate ions. Addition of chloride, bromide, perchlorate, and hydrogen sulfate did not result in appreciable change in color. Significant bathochromic shift for absorption maxima and naked eye color changes in the visible region are presumably due to the formation of hydrogen bond interactions between the anions and the phenol protons of sensors. All the anions were added as tetrabutylammonium salts in acetonitrile solution. The titration of receptors using protic polar solvents such as water and methanol did not result in naked-eye anion sensing because protic solvents compete for anions at the phenolic OH hydrogen bond site. This indicates that the receptors act as colorimetric sensors for selected anions by means of hydrogen bonding interactions. [This study was supported in part by a grant from the National Science Foundation, HRD support grant number 062776, to Belygona Barare, Graduate Student, Morgan State University, Baltimore, MD, 2007].

## 18. The Adsorption of Fatty Acids Using Soy Hull and Rice Hull

*Vernesha Brooks, Claflin University*  
*Uruthira Kalapathy, Claflin University*

The goal of this study is to investigate the adsorption of fatty acids onto soy hull and rice hull. This study would allow us to evaluate the use of soy hull and rice hull as an adsorbent in vegetable oil processing to remove fatty acids. Currently, adsorption using silica or treatment with a sodium hydroxide is used to remove fatty acids from vegetable oils. Soy hull and rice hull are underutilized co-products of food industry. Research toward new application of these materials would benefit the food industry. The experimental procedures for the soy hull and the rice hull were similar. The sample has to be grinded to a very fine substance for 20 minutes maximum. Oleic acid was used as a model fatty acid compound. Oleic acid was dissolved in 70% ethanol to prepare a 0.5% oleic acid solution. The oleic acid solution (25.0 ml) was treated with 1.0 g of adsorbent and mixed for 30 minutes. Then the samples were filtrated to separate the solid from the liquid. The solid was then placed under the hood overnight for drying. The dried solid material was then transferred into tinted sample bottles with caps and labeled for FTIR analysis. The dried samples are weighed (0.02 g) and mixed with KBr (0.98 g). The mixture was ground using a mortar and pestle and placed in the FTIR sample holder. Omnic software was used to complete the FTIR analysis. The pure KBr sample was run first to obtain a background. Then samples were analyzed in triplicate. The background signal was subtracted from the sample response and the final spectrum was saved. The carbonyl group of fatty acid absorbs at  $1,700\text{ cm}^{-1}$ . Hence, the absorption at  $1,700\text{ cm}^{-1}$  was used as an indicator of the amount of oleic acid adsorbed onto the adsorbents. Preliminary data indicate a significant amount of adsorption of oleic acid by rice hull and soy hull. Research is in progress to compare the adsorption efficiency of these materials with that of silica. This study would enable us to understand the adsorption process of fatty acids onto rice hull and soy hull and to demonstrate the application of these materials in vegetable oil refining.

## 19. Investigation of Cyclopropyl Carbene Formation from Bromo-Silyl Cyclopropane

*Jamika Brown, Norfolk State University*  
*Neil Allison, University of Arkansas*

The goal of this experiment is to form a cyclopropylcarbene that will rearrange to vinylallene and cyclopentadiene by conducting a reaction with bromosilyl cyclopropane and a fluoride ion as shown in Figure 1. The fluoride ion will be used for a strong silicon-fluoride bond with concomitant

cleavage of the carbon silicon bond, resulting in carbene-carbene rearrangement. This reaction, to our knowledge, has not been reported and will be a model reaction for a reaction that will produce a transition metal complexed vinylallene, which is used in preparing quinone methides, a class of chemotherapeutic agents. Three different fluoride sources (TBAF, HF, and KF) were tested in this experiment to initiate carbon-silicon bond cleavage. Of the three, only one (TBAF) reacted with the bromosilylcyclopropane, resulting in data that could not be interpreted.

## 20. Signal Amplification by Redox Cycling at an Integrated Microelectrode Array in a Microchannel Device

*Leethaniel Brumfield III, Langston University*  
*Penny Lewis, University of Arkansas*  
*Emily Anderson, University of Arkansas*  
*Ingrid Fritsch, University of Arkansas*

Interest in the development of automated devices that can perform multiple steps for the analysis of samples using small volumes has generated research involved in developing new ways of incorporating electrochemical detectors with these lab-on-a-chip (LOC) devices. A new device that integrates a polydimethylsiloxane (PDMS) microchannel with a microelectrode array for electrochemical detection of a sandwich type immunosorbent assay (ELISA) was fabricated and characterized. The PDMS channel was adhered to a glass slide containing the electrode array, and the channel was closed by clamping the PDMS-covered glass slide with a piece of plain or gold-coated silicon wafer. Instrumentally induced (or active) redox cycling resulted in amplification factors as high as 1.65 V for the closed-channel, internal 3-electrode setup. The observable detection limit of PAPR was determined to be 4 mM. Preliminary results for the detection of PAPR, generated by incubating para-aminophenylphosphate (PAPP) with the immunoassay, indicated that this device was an effective detector for the mouse IgG model system. Once the device is perfected, it can be used to optimize the mouse IgG model system.

## 21. Preparation and Characterization of 3,5-Diacetyl-2,6-Heptanedione

*Lafondria Carson, Southern University of Baton Rouge*  
*Sylvester Burton, Southern University and A&M College*

Two aldol condensation products may be formed when 2,4-pentanedione (acetylacetone) is condensed with formalin (37% formaldehyde). In this reaction, when a 2:1 molar ratio of acetylacetone and formalin are respectively combined, 3,5-diacetyl-2,6-heptanedione, C<sub>11</sub>H<sub>16</sub>O<sub>4</sub> (I), is exclusively formed. The 3,5-diacetyl-2,6-heptane has been envisioned for its potential to serve as a linker in the preparation of metal coordinated (Cu, Ni, Zn) molecular solids and coordination polymers. If prepared, the molecular solids should be able to serve as porous inorganic-organic solids to encapsulate selective guest molecules.

## 22. Stability of N<sub>12</sub>C<sub>12</sub>H<sub>12</sub> and the Effects of Endohedral Atoms and Ions

*Kasha Casey, Alabama State University*  
*Douglas L. Strout, Alabama State University*  
*DeAna McAdory, Alabama State University*  
*Jacqueline Jones, Alabama State University*  
*Ami Gilchrist, Alabama State University*  
*Danielle Shields, Alabama State University*  
*Ramola Langham, Alabama State University*

Cages of carbon and nitrogen have been studied by theoretical calculations to determine the potential of these molecules as high energy density materials. After previous theoretical studies of high-energy N<sub>6</sub>C<sub>6</sub>H<sub>6</sub> and

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N8C8H8 cages, a series of calculations on several isomers of the larger N<sub>12</sub>C<sub>12</sub>H<sub>12</sub> are carried out to determine relative stability among a variety of three-coordinate cage isomers with four-membered, five-membered, and/or six-membered rings. Additionally, calculations are carried out on the same molecules with atoms or ions inside the cage. Trends in stability with respect to cage geometry and arrangements of atoms are calculated and discussed. Stability effects caused by the endohedral atoms and ions are also calculated and discussed.

## 23. Characterization of Tn917 Mutants that Show Enhanced Biofilm Phenotype Compared to Wild-Type *Enterococcus faecalis*

Jason Chandler, Langston University

John K. Coleman, University of Oklahoma Health Science Center

Phillip S. Coburn, University of Oklahoma Health Science Center

Arto S. Baghdayan, University of Oklahoma Health Science Center

Nathan Shankar, University of Oklahoma Health Science Center

*Enterococcus faecalis* has emerged as a leading cause of infections acquired in the hospital setting that are notoriously difficult to treat due to resistance to multiple therapeutic agents. An important trait among a variety of these strains is the ability to form biofilms. Biofilms are bacterial communities attached to a biotic or an abiotic substrate and encased in a polysaccharide matrix. To understand the biofilm-forming characteristics of *E. faecalis*, we studied a previously characterized Tn917 mutant bank in a high-biofilm-forming strain, E99. In preliminary experiments, three mutants (P11B11, P9E1, and P63E10) were identified that possessed an increased capacity to form biofilms relative to E99. In the current study, these strains were characterized further to confirm the increased biofilm-forming phenotype relative to E99 and to map the location of the Tn917 insertion in each of the mutants. Biofilm assays using crystal violet staining revealed that while these three mutants demonstrated marginally higher biofilm-forming abilities than E99, these differences were not statistically significant. Inverse PCR and DNA sequencing revealed that Tn917 is inserted in approximately the same location in all three strains—namely the replication control region of a pTEF2-like plasmid element. Future work using other methodologies for quantifying biofilm formation will be needed to definitively conclude whether differences exist between E99 and these three mutants. [This work was supported by the National Institutes of Health, the National Science Foundation, and OK-LSAMP.]

## 24. Study on the Reaction Between Cyanamide and 1,3-Diaminopropane and the Structure Determination of Melamine and 1,3-Diazaperhydroin-2-One, Including X-Ray Single Crystal Structure

Eva A. Clark, Jackson State University

Vyvya Jones, Jackson State University

Ken S. Lee, Jackson State University

Endogeneous agmatine, which is a degradation product from L-arginine by a decarboxylase, is known to be neuroprotective. Our research interest is to regulate the level of agmatine in the brain. The way to control the level of agmatine in the brain is to inhibit the agmatinase, which degrades agmatine into polyamine and others. From a previous study including QSAR 3-aminopropylguanidine (APG) shows the most promising inhibitory activity toward the agmatinase. Therefore, the preparation of APG with other derivatives has become our research focus. We have designed the reaction pathway to form APG in one step by using cyanamide. However, the reaction gives melamine and cyclic urea as the major products and APG as the minor product. Melamine was formed from the trimerization of cyanamide, while the cyclic urea resulted from APG hydrolysis. The

pure products were characterized by <sup>1</sup>H and <sup>13</sup>C nuclear magnetic resonance, LC-MS, and X-ray single crystallography.

## COMPUTER SCIENCES AND MANAGEMENT INFORMATION SYSTEMS

### 25. An Interface to Search Educational Topic Maps

Jerry Akouala, Winston-Salem State University

Christo Dichev, Winston-Salem State University

Topic Maps for e-Learning (TM4L) is an authoring environment for creating and using educational topic maps. The goal of this research was to design an easy-to-use, intuitive interface that helps the user to search information in TM4L. To do this, new functions had to be added to the editor implementing a query-based search. The new functionality allows the users to define their queries in two different ways: as TOLOG-based expressions or in a query-by-example (QBE) mode. In topic maps, users generally search information about topics based on the associations they are involved in or the type of their resources. Thus, QBE provides two query templates: association-based queries and resource-based queries. The created new interface for QBE search in topic maps is user-friendly and much more efficient for displaying needed information compared with topic map browsing.

### 26. Computer Simulations in Card Shuffling: Ensuring Sufficient Randomness for Fair Card Games

Chad Artis, University of Maryland Eastern Shore

Dr. Fletcher Lu, University of Maryland Eastern Shore

Most research into card shuffling has developed theoretical bounds on the required number of shuffles to achieve “randomness” in a standard deck of 52 playing cards. Almost none of the random walk approaches used have good lower bounds available (Diaconis, 2003). This paper demonstrates that a lower bound to randomness is directly proportional to the size of the number of cards revealed during a card play, under the precondition that the rest of the unrevealed deck is sufficiently randomized. Thus, a lower bound to the number of shuffles to randomize a deck is dependent on three conditions: the size of the overall deck, the number of revealed cards during a card game play, and the type of shuffle being used. We empirically develop a tight lower bound on the required number of shuffles to achieve randomness through computer simulation. The shuffling approaches used include both the riffle and overhand approach considering multiple start states of both poker and blackjack games.

### 27. A Sequence Mining Approach for Predicting Normal and Abnormal Environmental Conditions that Induces Coral Reef Stress and Contributes to Its Recovery

Trevis Baker, University of the Virgin Islands

Marc Boumedine, University of the Virgin Islands

This preliminary work explores the use of sequence mining techniques to derive normal or abnormal environmental conditions before, during, and after coral reef bleaching. Sequences of events are derived to identify frequent and infrequent environmental patterns. These patterns are then used to determine which environmental conditions are more likely to induce coral bleaching or be most favorable to coral reef recovery. After presenting the sequence mining algorithm, examples of event sequences are analyzed. The viability of this approach is finally discussed on National Oceanic & Atmospheric Administration Coral Reef Early Warning System (NOAA CREWS) data sets.

## 28. Bioinformatic Investigation of Iron Metabolism in the *Bdellovibrio Bacteriovorus* Genome

*Mema Bama, Morgan State University*  
*Eric Sakk, Morgan State University*

*Bdellovibrio bacteriovorus* is a delta proteobacterium with a biphasic life-cycle. In the first phase, predatory, *B. bacteriovorus* searches and attacks certain gram-negative bacteria via chemotaxis. After it has both attached itself to the cell membrane of its prey and has invaded the prey's periplasmic space, the reproductive phase begins. The genome of *B. bacteriovorus* has recently been sequenced and annotated. However, many genes and regulatory sequences involved in the predatory and reproductive phases of its lifecycle still remain enigmatic. Our research consists of developing and applying computational and bioinformatic techniques and existing databases to decipher those networks within the genome of this bacterium. We use two approaches. First, we extract non-coding DNA sequences upstream of the operon candidates and perform a multiple alignment. Second, regulatory sequence models are constructed based on existing literature, and string searches are performed using these models. The two approaches are then compared to verify the regulatory sequences. Based on existing literature and by applying various bioinformatic tools, we have identified several operons containing genes implicated in iron metabolism. In addition to these novel genes, we also identified associated regulatory sequences. Finally, genes annotated as "hypothetical" or "function unknown" have been found in operons containing known iron metabolism genes. Because of the associated regulatory sequences such as FUR candidates occurring in proximity to these operons, we believe it is worthwhile to confirm the function of such genes. Furthermore, it is also important to verify the function of the predicted regulatory sequences as well. Hence, future research will be geared toward linking these computational studies with experimental confirmation. [This study was supported by a grant from the National Science Foundation (0506066) and the Morgan State University HBCU-UP Undergraduate Research Program, Baltimore, MD 21251.]

## 29. Employment of Certain C++ Constructs for Achievement of Generic Programming

*Armand R. Burks, Alabama State University*  
*Iraj Danesh, Alabama State University*

With the help of the concept of logical AND, and `reinterpret_cast`, using selected and tested constructs, a highly short and concentrated code was developed that can check for existence of six possible conditions in one function. This study revealed that, it is possible in C++ to write a generic or type-independent function without use of built-in available facilities. In this study, an attempt was made to employ some other constructs in C++ for the purpose of writing generic programs. The present work has laid the foundation for future work to study topics beyond generics, functors, generic libraries, and even features in other languages.

## 30. Topic Maps for Organizing Digital Collections

*Timothy Campbell, Winston-Salem State University*  
*Darina Dicheva, Winston-Salem State University*

The Internet can be best described as the information highway. With this description, the actual information is the destination. Following this metaphor, an obvious question can be asked: "How do I get the information I need?" This can easily be determined by going from one point to another, but the way most websites are indexed and referenced, this type of exhaustive search is impractical. Based on my research on the Semantic Web, I argue in this paper that by using the Topic Map approach, information can be traced by relation and retrieved with higher accuracy than common methods applied by the conventional search engines. Topic

Maps eliminate the problems derived from the excessive amount of information by proposing a way to better organize and find information over an unstructured information site. Topic Maps are structures that encode information about a domain and connect it to information resources that are considered relevant to that domain. Topic Maps are organized around topics, which are symbols representing real-world things, associations between the things, and occurrences, which connect the topics to information resources related to them. People frequently do not share the same idea; so one point of view can be different from another and still end up at the same topic. For example, in a "music" context, a topic such as "jazz" could be reached in more than one way and yet still be related to all relevant topics. Some of the questions discussed in the paper include the following: How can we structure information so people can easily find what they want? How can we share our knowledge with others? Concept modeling is widely used in many information-related activities, including e-learning. Some practical aspects of the Topic Maps will be illustrated based on a specific application—a Topic Map-driven music collection.

## ECOLOGY, ENVIRONMENTAL & EARTH SCIENCES

### 31. Effect of a Single Needle Puncture Through the Eggshell of Broiler Eggs on Hatchability and Development in Domestic Fowl (*Gallus Gallus Domesticus*)

*Rohina Amiri, Delaware State University*  
*S. Brougher, Delaware State University*

A novel approach to poultry vaccines is to administrate in ovo to fertile broiler eggs. This allows poultry producers to take advantage of the Embrex Inovoject (Research Triangle Park, NC), an automated system that delivers multiple vaccines to developing chicken embryos. This method offers multiple disease protection in a single dose of vaccination. While this delivery system improves the speed and efficacy of vaccine delivery, there remains a concern, as this method requires the puncture as a small hole through the eggshell near the air cell. It is unclear if this procedure is at all detrimental to the developing chick. In particular, this may alter the O<sub>2</sub>/CO<sub>2</sub> environment in the egg, which is likely at a critical balance for proper embryonic development. It was hypothesized that small hole punctures in fertile eggs could disrupt embryonic development, potentially increasing embryonic mortality and reducing hatchability. A small hole was drilled through the eggshell of fresh fertile eggs and incubated at 37°C and 65% relative humidity. Control (unpunctured) eggs were used as a comparison. Samples (n = 4 eggs/treatment/day) were collected from embryonic day 14 through hatch (day 21). We recorded embryo, lung, and brain weight (g). Brains and lungs were collected and frozen at -80°C for further analysis. A subset of eggs were incubated through day 21 (hatch) to determine hatchability effects. Unhatched eggs were staged to determine the age at which development terminated. Results showed 86% hatchability for control eggs, as compared to a rate of 67% hatchability for punctured eggs. Throughout embryonic development, both lung weights were significantly higher for punctured eggs, compared to unpunctured eggs, while brain weights for punctured eggs were significantly lower. In conclusion, the results of our study indicate that puncturing a hole into the air cell of chicken eggs decreased their hatchability as well as altered rates of organ development and growth. Body weight was significantly lower for punctured eggs throughout embryonic development. Future analysis on molecular aspects of the lungs and brains of these embryos may help to elucidate the underlying mechanisms of these disruptions to the developing chick.

# Abstracts

## 32. Using Acoustic Doppler Current Profiler (ADCP) Data to Determine Red Hind (*Epinephelus guttatus*) Fish Spawning at Hind Bank

*Afiya Fredericks, University of the Virgin Islands*  
*Marra Austria, University of the Virgin Islands*  
*Jodie Hodge, University of the Virgin Islands*  
*Nasseer Idrisi, University of the Virgin Islands*

The purpose of this project is to determine if the spawning period of fish at Hind Bank is at neap or spring tide. We will test the hypothesis that, around the full moon, Red Hind (*Epinephelus guttatus*) Fish spawn when currents bring eggs northeast on Hind Bank, followed by westerly currents that spread the eggs/larvae onto the bank. The acoustic Doppler current profiler (ADCP) was used to measure the currents speed, direction, backscatter data (signal strength), and temperature at varying depths at the bank. The retrieved data were taken near full moon from December 2005 to February 2006 and were preprocessed in Nortek Storm Software, reformatted, and interpreted in MATLAB.

## 33. Influence of Sucrose Concentration on In Vitro Growth and In Situ Acclimatization

*Victoria Henry, University of the Virgin Islands*  
*Zimmerman, University of the Virgin Islands*  
*Thomas W. Mentor, University of the Virgin Islands*

Cassava (*Manihot esculenta*) is a tropical crop grown for its starch-storing tuberous roots. Cassava is a major source of food in Africa and South America, as well as being tolerant to poor soils and drought. New highly productive cassava varieties are being developed, and tissue culture has been a tool to micropropagate and distribute them. However, cassava suffers from high mortality during acclimatization from in vitro. The purpose of the research was to compare the growth and development of cassava plants grown in vitro on Murashige and Skoog medium containing 2% and 8% sucrose. The high sucrose concentration reduced plant height and rate of growth in vitro. Because cassava roots are sensitive to wounding and can deteriorate rapidly, in vitro grown plants were directly rooted ex vitro in potting soil or in sterile vermiculite. A high survival rate was obtained from both rooting in vermiculite and direct rooting. The high sucrose allows for starch to accumulate in the stems assisting the plants to quickly develop roots and continue growth during acclimatization. This protocol has potential to assist in assuring greater survival of micropropagated cassava.

## 34. Species Diversity of Fish and Shrimp in Gut Streams Is Related to Land Development and Human Activities in St. Thomas, USVI

*Duvane Hodge, University of the Virgin Islands*  
*Donna Nemeth, University of the Virgin Islands*  
*Rifca Mathurin, University of the Virgin Islands*  
*Reynata Platenburg, University of the Virgin Islands*

St. Thomas, Virgin Islands, is characterized by steeply sloped hillsides that channel water flow after heavy rains in freshwater stream "guts." Encroaching human development, with its potential negative inputs of sewage, sedimentation, and chemicals, could limit the ability of this seasonally variable habitat to support aquatic life. We tested the hypothesis that the diversity of fish and shrimp species in the gut streams will be lowest in the more developed watersheds. We selected three St. Thomas guts that varied in degree of development and visited each gut three times (June 2006 to February 2007) to collect water quality data and identify aquatic organisms present. Five species of shrimp and four species of fish were identified. Individual guts varied slightly in species diversity, with the more developed guts containing introduced fish species and fewer native

species. To correlate development with impact on water quality, we measured temperature, pH, total dissolved solids, salinity, and conductivity in five pools within each gut on each visit. No clear differences were found among the guts. Total phosphorous concentration was elevated in the area with the most human disturbance. Total Kjeldahl Nitrogen was similar among the guts, except at the site of a known sewage input. Our hypothesis was supported in that the number of native shrimp and fish species was lowest in the gut with the most residential and commercial development. However, the number of species present was extremely small, and few differences found in the water quality parameters measured would account for this. Other factors such as chemical pollutants, seasonal variation in stream volume, and dissolved oxygen may have a greater effect on these gut communities than the parameters we measured. Understanding the impact of island development on these ephemeral habitats could contribute to better natural resource management as well as identify sources of pollution to the marine environment downstream.

## 35. The Integration of Science and Technology in Predicting the Ecological Effects of an Impact with Apophis

*Byron Knowles, Dillard University*  
*Jose Ramirez-Domenech, Dillard University*

Never before in the history of humanity has our influence been so far reaching as to influence the ecological course that our planet will take. Even while this prospect seems daunting on so many levels, another fact is equally as astonishing as this one. Never before in our history have we been able to integrate science and technologies to not only predict ecologically significant events and their effects in the near future, but also to predict ecologically significant events in the distant future as well. This project attempts to predict the affects of an asteroid impact on earth's ecology using predictive software and mathematical modeling. In Egyptian mythology, Apophis was the personification of evil and destruction, a god that was determined to thrust the world into perpetual darkness. This name seemed right to scientists when naming an asteroid plunging towards Earth from outer space. Astrophysicists are presently observing a 390 m wide asteroid that is prospectively on a collision course with our planet and are petitioning governments to decide on a tactic for dealing with it. On April 13, 2029, Apophis will come closer to earth than any asteroid has been in all of recorded history. If it goes through a one-mile-wide keyhole, the gravitational pull of the earth will change its orbit, and on April 13, 2036, the asteroid will hit the Pacific Ocean with the power of 58,666.67 Hiroshima bombs. The resulting tsunamis will cause more destruction than any natural disaster in human history, and the effects to the environment and surrounding wildlife will be astronomical. This study attempts to address these issues and tries to extrapolate the resulting environmental effects of an impact on this scale.

## 36. Effects of Eutrophication on Eelgrass Growth in the Chesapeake Bay: An Observational Experiment

*Danielle Morvan, University of Maryland Eastern Shore*  
*Arthur L. Allen, University of Maryland Eastern Shore*  
*Fawzy Hashem, University of Maryland Eastern Shore*

Eelgrass *Zostera marina* L. is a form of submerged aquatic vegetation found in many marshlands near areas such as the Chesapeake Bay. Eelgrass provides food and shelter for many small marine animals and helps to prevent soil erosion. Currently, the amount of eelgrass near the bay is reducing because of eutrophication. Eutrophication is a condition in an aquatic ecosystem where high nutrient concentrations stimulate algae blooms. Human activities can accelerate eutrophication by increasing the rate at which nutrients and organic substances enter into the ecosystem. This study examined the response of eelgrass communities to excess nu-

trient loading. A greenhouse mesocosm experiment was conducted using six tanks each with a different treatment. Tank F was the control that contained no added nutrients and tanks A–E all contained different levels of nitrate and phosphate ranging from 0.02% additional treatment to about 0.10% of the average amounts needed of the nutrients. This experiment monitored mainly the growth of the plants to indicate the effects the nutrients had on the eelgrass. The growth rate of the plants that received less added nutrients was greater than for plants with the greater amount of additional nutrients, suggesting the growth rate and amount of nutrients are linearly related. Surplus nutrient loading enhanced algae growth, therefore increasing shade and reducing the amount of available light within the plant beds. Shade and nutrients on eelgrass density, growth, and biomass implied that the harmful effect of algae on eelgrass growth could occur through light reduction. This research showed the indirect effects of eutrophication on eelgrass production. It also suggested that increased nutrient loading resulted in less light being available for eelgrass because of algae blooms, which resulted in lower levels of photosynthesis and thus a decline in eelgrass growth.

### 37. Use of Microcosm Studies to Assess the Relationship Between Aquatic Plants and Soil Microorganisms

*Charles Rucker, Mississippi Valley State University*  
*Rachel Beecham, Mississippi Valley State University Wahome,*  
*Mississippi Valley State University*  
*Mark Weaver, USDA-ARS*  
*Robert Zablotowicz, USDA-ARS*

In this mini wetland study on the relationship between aquatic plants and soil microorganisms, I plan to show the differences in the soil microbial activity by performing a series of tests on the basic composition of the soil in each plot in the microcosm study. The plant species in this experiment might be expected to promote the growth of different microbial communities in the soil and rhizosphere. We examined the soil for differences in the microbial communities, as represented by fatty acid methyl esters (FAME) and determined if they had different enzymatic properties. In (FAME) analysis, the materials were cleaned with Alconox, hexane, and HCL. Two grams of fresh weight soil was placed into 35 ml Kimble tubes. A total of 10 ml of 0.2N KOH in methanol solution 1a and 5.6 g KOH adjusted to 500 ml with MEOH was added. The samples were vortexed and incubated in a rotary shaker/incubator at 37°C for 1 hour at 125 rpm. A total of 2 ml of 1N acetic was added. Then 5 ml of high-performance liquid chromatography grade hexane was added, vortexed, and centrifuged at 2,000 rpm. Hexane extraction and combined hexane fractions should be repeated. Once hexane has evaporated and been resuspended in 1 ml of 1:1 ml methyl tert-butyl ether and hexane, it is then transferred.

### 38. Identification of Mu Insertions that Cause rgh/ Defective Kernel Mutations in Maize

*Arturo White, Fort Valley State University*  
*Mark Settles, University of Florida*

There is a great variety of mutant phenotypes of the maize endosperm, most of which are poorly understood. This project aims at the identification of Mutator (Mu) transposon-tagged mutations affecting aleurone development in maize endosperm resulting in rough/defective kernels in maize. Mu elements are characterized by a higher rate of forward mutations than other transposable elements in maize. Three different Mu transposon-tagging populations were used in the studies (065-9028, 065-9031, and 065-932) that were self-pollinated to recover the novel transposon gene disruption in each plant. From each population, 17, 15, and 20 ears were sampled for DNA, respectively. The DNA samples were then screened by PCR with specific primers for Mu elements. The results from PCR have been visualized and analyzed using standard agarose gel (1.0%). Phenotypic

data were also scored for rgh/mu and wild-type for all the ears from each population. The screening process has clearly identified the Mu insertion in each population responsible for causing rgh/defective kernels in maize. Such studies will help track the seed stocks that segregate for gene knock-outs in maize and also provide reverse genetics resources to the maize research community. [This study was supported by a grant from the National Science Foundation (NSF) awarded to Dr. Sarwan Dhir, PhD, Associate Professor and Director, NSF HBCU-UP, S-STEM, and REU Site Programs, Center for Biotechnology, Fort Valley State University, Fort Valley, GA 31030.]

### 39. Inducing Somatic Embryogenesis in Alfalfa (*Medicago sativa*) Through the Use of Plant Growth Regulators

*Tanisha White, Fort Valley State University*  
*Lamond Halbert, Fort Valley State University*  
*Hari P. Singh, Fort Valley State University*

Alfalfa (*Medicago sativa*) is a perennial flowering plant cultivated as an important forage crop. Alfalfa sprouts are used as a salad ingredient in the United States and Australia. Tender shoots are eaten in some places as a leaf vegetable. Alfalfa has shown problems with seed germination and plant establishment. An effort has been made to develop a protocol for large-scale propagation of Alfalfa using growth regulators. NAA, 2, 4-D, and IBA has been tested, and it was found that the best concentration for callus formation and growth was 2.5 and 0.25 mg/l of 2,4-D and BAP, respectively, whereas a 0.5 mg/l concentration of IBA was the best concentration for somatic embryo formation. Using NAA as a supplement with IBA has resulted in no significant changes. Further studies are needed to study the regeneration protocol for successful establishment of the entire plant. [This study was supported by USDA Capacity Building/National Science Foundation (NSF) HBCU-UP grants awarded to Dr. Sarwan Dhir, PhD, Associate Professor and Director, NSF HBCU-UP, S-STEM, and REU Site Programs, Center for Biotechnology, Fort Valley State University, Fort Valley, GA 31030.]

### 40. Soybean Leaf Defoliation and Tolerance of Silver Spotted Skipper (*Epargyreus clarus*) in the Delmarva Region

*William Wyant, University of Maryland Eastern Shore*  
*Bessie Green, University of Maryland Eastern Shore*  
*Fawzy Hashem, University of Maryland Eastern Shore*

Silver spotted skipper, *Epargyreus clarus*, is a common Lepidopteran pest of forage and grain soybean [*Glycine max* (L) Merr.] in several counties in the Delmarva region. The climate of this region has proven to be conducive to elevated pest growth, which can cause significant annual economic loss to the sustainable crop. Soybean field observations of the regional farms and the research plots at the University of Maryland Eastern Shore, Princess Anne, Maryland, showed, as in previous years (2003–2006), from 50 to 70% leaf defoliation, respectively. In vitro studies of field-grown forage soybeans (Moon Cake, control, 7P116, XB-32, Donegal, Tyrone, Tara, and Derry) and grain soybean (Schillenger 495RC, control, 9444169, SE73753, and SE73090) leaves were used to conduct an assay on the defoliation and tolerance of the Lepidopteran pest [0.1–0.66 g weight (wt) of larvae from control plots]. The forage soybeans assay showed that 7P116 was defoliated 85%, with larvae weight gain of 0.646 g compared to control (Moon Cake) of 25% and 0.058 g weight, respectively. The grain soybeans assay showed that 491,734 were 50% defoliated with larvae weight gain of 0.732 g compared to control (Schillenger 495RC) of 20% with 0.148 g, respectively. These genotypes were found to be most significantly susceptible to *E. clarus* infection than the other assayed soybeans. Therefore, the data from this experiment suggest that genotype, larvae weight, and other environment conditions warrant further study as a viable strategy for insect control.

# Abstracts

## PHYSICAL & MATHEMATICAL SCIENCES

### 41. Concept of Congruence Plays a Big Role in the Theory of Divisibility

*Ernest Baukmon, Savannah State University*  
*Tony Wright, Savannah State University*  
*Mulatu Lemma, Savannah State University*

The concept of congruence plays a big role in the theory of divisibility. In our study, we master different properties of congruence and deeply investigate its applications to the divisibility theory. We will observe that the concept of congruence is such a powerful technique in dealing with the concept of divisibility. Fermat's and Wilson's Theorems will be studied and applied in the theory of divisibility. Several impressive applications will be discussed with different mathematical techniques discussed.

### 42. When Does Sigma Preserve Addition?

*Everard Bellot, University of the Virgin Islands*  
*Douglas Iannucci, University of the Virgin Islands*

Sigma is an arithmetic function whose domain and range is the set of natural numbers  $N$  and is represented by the Greek letter  $\sigma$ . Let  $m$  and  $n$  be natural numbers; then  $\sigma(m)$  and  $\sigma(n)$  denote the sum of the positive divisors of the natural numbers  $m$  and  $n$ , respectively. It is known that  $\sigma(mn) = \sigma(m)\sigma(n)$  as long as  $m$  and  $n$  are relatively prime, i.e., they have no common divisor besides one. In this study, we endeavor to find properties that  $m$  and  $n$  must have for which  $\sigma(m + n) = \sigma(m) + \sigma(n)$ . We decided to look at  $m$  and  $n$  each as a multiple of two numbers, where one of the numbers is prime and the pair is relatively prime. We let  $m = ap$ ,  $n = bq$ , and  $m + n = cr$ . Because we know sigma is multiplicative, we are able to take the product of the sigmas to obtain the sigma of the product [i.e., for example  $\sigma(m) = \sigma(a)\sigma(p)$ ]. After manipulating the two equations,  $ap + bq = cr$  and the equation obtained from taking the sigma of the numbers, various assumptions are made. From the assumptions, we found that it is demanded that  $\sigma(a)/a < \sigma(b)/b$ . After making these assumptions, we arrived at two relatively complex congruencies. We are yet to solve the properties that  $m$  and  $n$  must have for which  $\sigma(m + n) = \sigma(m) + \sigma(n)$ ; however, we have made several assumptions that have made our search for these properties much easier.

### 43. Modeling Brain Bioelectric Behavior

*Javon Carter, Winston-Salem State University*  
*Mansour Samimi, Winston Salem State University*

Neurons communicate with cells and other neurons through generating electrochemical impulses and conduct them along membranes. Understanding of the dynamical connectivity of over one hundred billion neurons in the brain, each connecting with several thousand others, will, without any doubt, open the door to the recognition and discovery of numerous unknown functions and dysfunctions of the nervous system. In this project, I construct a mathematical model in the form of a system of differential equations for the sodium-potassium exchange pump, the mechanism in which information transfers throughout the brain, generating a complex network. This dynamical system is composed of two equation forms based on the two phases of the mechanism involved in the Na-K change pump. Using a qualitative method of solution of ordinary differential equations and technology, a thorough analysis of the solutions for each mechanism and for the whole system will be concluded.

### 44. Mathematical Modeling of the Effects of Buoyancy on a Robotic Arm

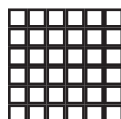
*Nixon Davis, Coppin State University*  
*Sean Brooks (University Advisor), Coppin State University*

In this work, we consider planar motions of a robotic arm. In particular, rotations associated with planar revolute joints, and retractions, and extensions associated with prismatic joints are modeled. The algebraic and geometric structure of our mathematical model is given in terms of ideals and varieties, respectively. It is shown how buoyancy affects these mathematical objects. This is done by exploring the dynamics of the model in terms of forward and inverse kinematics and by using the Groebner basis and varying parameters of the basis. Finally, there is a great need to apply advanced mathematics into the area of robotics in general. Moreover, the area of fluids coupled with robotics and advanced mathematics is waiting for more exploration.

### 45. Winning Strategy of Square-Off Game

*Shaun Ford, Savannah State University*  
*Shinemin Lin, Savannah State University*

Square-Off is played by two players on a  $6 \times 6$  grid as shown below:



Players alternate taking turns. On any turn, a player crosses off 1, 2, or 3 of the 36 small squares. (The squares need not be continuous or connected in any way.) The player forced to cross off the last small square loses. At this research, we will explore the winning strategy of different dimension Square-Off games using modular mathematics. Finally, I will prove the winning strategy of a generalized Square-Off game. The main theorem is as follows: Let  $k$  and  $n$  be positive integers. Consider Square-Off on an  $n \times n$  grid, where a move consists of crossing off any number of squares from 1 to  $k$  inclusive. Prove that player 1 has a winning strategy if and only if  $\text{mod}(k + 1)$ .

### 46. Cyclopeptides: Selectivity in Metal Ion Binding and Sensing

*Willie Gilbert, Winston-Salem State University*  
*Maria Ngu-Schwemlein, Winston Salem State University*  
*Stephanie Jackson, Winston-Salem State University*

The design and development of optical sensors for the detection of toxic metal ions has significant applications in environmental chemistry. Previous studies by our group have shown that a model acidic cyclopeptide, containing alternating L- and D-amino acid residues, acidic side chains, and an intrinsic fluorophore (CP-1), exhibited selective binding and specific fluorescent responses toward some divalent transition metal ions. The present study was undertaken to develop a clearer understanding of the interactions of acidic cyclooctapeptides with heavy metal ions by changing the primary structure of the cyclopeptide or the ring size. Cyclo[D-Leu-Glu-D-Trp-Glu-D-Leu-Glu-D-Leu-Glu] (CP-2) and cyclo[D-Ala-Trp-D-Ala-Glu] (CP-3) were prepared for this study. Their metal-ion binding and associated thermodynamic parameters were evaluated by isothermal titration calorimetry. Specific metal ion signaling by the fluorogenic cyclopeptides was assessed by fluorescence spectroscopy. The results from this study indicate that CP-2 exhibits equal or better selectivity and specificity in metal ion binding and fluorescence responses in the presence of metal ions. In contrast, CP-3 shows weaker interactions with metal ions, which correlates with the smaller modulation in fluorescence emission proper-

ties. The above study shows that the primary structure and ring size of acidic cyclooctapeptides play an important role in bimolecular interactions with metal ions.

## 47. Hard Nano Magnets of $\text{Sm}_2\text{Fe}_{17}\text{N}_x$ and $\text{Eu}_2\text{Fe}_{17}\text{N}_x$ Prepared by Mechanical Alloying

Cleao Henderson, Morgan State University  
Dereje Seifu, Morgan State University

There are few types of hard magnets that are in use in today's technology even though hard magnets are used in all types of probes and devices. It is important to find alternate permanent magnets using more abundant materials and observing it at a nanoscale to see if they are of valid and sufficient use in NEMs (nanoelectromechanical systems). In this project, we will study a potential permanent magnet; this will be the  $\text{R}_2\text{Fe}_{17}\text{N}_x$  type magnet, where R is the rare-earth atom, and it will be studied in lower dimension. Samples of  $\text{Sm}_2\text{Fe}_{17}\text{N}_x$  and  $\text{Eu}_2\text{Fe}_{17}\text{N}_x$  will be prepared using a novel method known as mechanical alloying starting with pure elemental powders. Current SEM results display the structure of the samples' grains after milling the material for 20 hours. Observations indicate a defined and consistent compound, where grains of the final material cannot be fractured or welded any further. Sample preparation is carried out in an oxygen-free environment, and nitrogenation of samples will be conducted during the annealing process. This study will explore the magnetic and structural property of these materials in the nanoscale by encapsulating thus prepared nanosize sample material inside of carbon nanotubes using an established chemical method. Sample characterization will be carried out using  $^{57}\text{Fe}$  Mössbauer spectroscopy. A sample of  $\text{Eu}_2\text{Fe}_{17}\text{N}_x$  is prepared by mechanical alloying to probe both the transition metal and the rare-earth sites in the same sample of  $\text{R}_2\text{Fe}_{17}\text{N}_x$  type compound. This will be conducted using a  $^{57}\text{Fe}$  radioactive source to probe the transition metal site, which in this case is Fe, and  $^{151}\text{Eu}$  to radioactive source to probe the rare-earth site, which in this case is Eu, using Mössbauer spectroscopy. Further structural and synthesis will be investigated using electron back-scattering and scanning and tunneling electron microscopes. [This study was supported in part by a grant from NSF-HRD 0506066 Historically Black Colleges and Universities Undergraduate Programs (HBCU-UP)].

## 48. Grid Coloring: The Even Distribution Conjecture

Brett Jefferson, Morgan State University

Consider a finite set of nodes of a rectangular  $a \times b$  grid. Suppose we color each node with one of a finite set of colors  $\{c_1, c_2, \dots, c_c\}$ . Does there exist a coloring such that no four nodes of the same color form the corners of a rectangle? Such a coloring is called a *properly c-colored grid*. Is there a method to properly c-coloring grids? This project expands on work results from the 2006 SPIRAL Grid Coloring group. Grids were studied by size properly c-colorable given c colors. Dr. William Gasarch of University of Maryland, College Park, introduced the *Even Distribution Conjecture*. The EDC offered a structure to the number of colors per column. EDC c-colored grids were studied using calculus, algebra, and combinatorics.

SPIRAL 2006:

(Thm) All  $a \times b$  grids not containing the  $3 \times 7$  grid or the  $5 \times 5$  grid within it can be properly two-colored.

(Thm) An  $a \times b$  grid cannot be properly three-colored if it has a  $4 \times 19$  grid,  $5 \times 16$  grid, or a  $7 \times 13$  grid within it.

MORGAN STATE UNIVERSITY:

(Def) Pair  $(a^1, a^2)$  is a pair in a column if rows  $a^1$  and  $a^2$  have the same color.

(Def) Evenly distributed column – A c-colored column such that there are no colors,  $c_1$  and  $c_2$  with n appearances of  $c_1$  and  $n + k$  appearances of  $c_2$  ( $k > 1$ ).

(Def)  $E(a, c)$  – The number of distinct pairs in an evenly distributed column with a rows and c colors.

(Thm)  $E(a, c) = (c - r)(m \text{ choose } 2) + r(m + 1 \text{ choose } 2)$ , where  $a = mc + r$  and  $0 < r < c$ .

(Thm)  $E(a, c) \leq$  the number of pairs in a column with a rows and c colors.

(Thm)  $E(a, c) \times$  (maximal possible # of columns in a proper c-coloring with a rows) is less than or equal to  $(a \text{ choose } 2) \times c$ .

(Thm) If the  $a \times (b/c)$  grid can be c-colored with no bi-colored rectangles, then the  $a \times b$  grid can be properly c-colored. [Permutation Method]

(Thm) A  $p^2 \times (p^2 + p)$  grid can be properly p-colored for a prime number, p.

## 49. An Investigation in Astrophysical Gas Dynamics: Analyzing Two-Wave Interaction in Ideal Magnetohydrodynamics Using Numerical Analysis and Simulation

Marvin Jones, Jr., North Carolina A&T State University  
James M. Stone, Princeton University  
Ian J. Parrish, Princeton University

T.V. Zaqarashvili and B. Roberts present an interesting problem in ideal magnetohydrodynamics. They state that it has been found that a sound wave is coupled to an Alfvén wave with double the period and wavelength when the sound and Alfvén wave speeds are equal (Zaqarashvili and Roberts, 2006). This project presents a solution to this problem using simulation and numerical methods through Athena 1.1 (Gardiner and Stone, 2005), which is a higher order, unsplit Godunov method for ideal magnetohydrodynamics that uses constrained transport to preserve the divergence-free constraint of the magnetic field. According to Zaqarashvili and Roberts, the Alfvén wave drives the sound wave through the ponderomotive force, while the sound wave returns energy back to the Alfvén wave through the parametric (swing) influence. As a result, the two waves alternatively exchange their energy during propagation. This process of energy exchange is faster for waves with stronger amplitudes. The phenomenon can be of importance to astrophysical plasmas, including the solar atmosphere and solar wind (Zaqarashvili and Roberts, 2006). This project will also present an investigation of the claim that the process of energy exchange is faster when waves have stronger amplitudes.

## TECHNOLOGY & ENGINEERING

### 50. Closing the Hardware Design Loop with Multisim: A Case Study

Ayush Bhardwaj, Savannah State University  
Asad Yousuf, Savannah State University

Most recent electronics courses taught are planned around what is called a lecture and lab environment. This environment traditionally uses lectures on subject matter and is supplemented by laboratory experience. If the laboratory experiments are not generating the expected results, often the whole experiment needs to be repeated. The unexpected results could be due to faulty components, incorrect design specifications, or improper connections. Nonetheless, implementing a circuit in the lab with undesired output might be time-consuming. However, having an electronics simulator will enable the students as well as the instructor to analyze the performance of a circuit before implementing the actual hardware components. This paper investigates design, simulation, and implementation of decade counter using modern computer hardware and software. This effort will focus on developing an integrated solution of a digital electron-

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ics project that will be based on a hybrid environment in which the design and experiments will be simulated and tested in virtual as well as with real electronics components. The students' outreach program in this study is to motivate students to enroll in electrical engineering and technology programs and to create interest in science, technology, engineering, and mathematics (STEM).

## 51. Development and Implementation of Verilog A Models for Linear and Nonlinear Electrical Components

*Richard Bowling Jr., Morgan State University*  
*Michel A. Reece*

The scope of this project involves the development and implementation of Verilog A models for linear and nonlinear electrical components in Agilent's Advanced Design System (ADS). Verilog A is an IEEE standard analog hardware description language. It is designed for modeling the behavior of analog electrical components (i.e., resistors, capacitors, inductors, diodes, transistors). Verilog A models are transferable to many circuit simulator platforms such as ADS, Microwave Office, and Cadence. Verilog A can also be used to create behavioral models of analog blocks such as mixers and amplifiers used in communication systems. To date, COMSARE does not have the capability of developing and implementing Verilog A models within ADS. Enabling this capability within the research center will expand COMSARE's current modeling efforts. The outcome of this research will involve the development of Verilog A models for a resistor, transistor, capacitor, and diode in ADS.

## 52. Development of Student Manuals for Graphical Software

*Deborah Bryant, Savannah State University*  
*Pravin Raut, Savannah State University*

The department of Engineering Technology at Savannah State has 24 types of drafting software licensed by Autodesk. Students need textbooks to understand how to use the software. The scope of this research was to identify the number of software that does not have a textbook and develop a method for students to become acquainted with the software. Autodesk Map 3D 2007 was chosen to develop a manual in an easy format for new users. It is hypothesized that a student-developed manual for Autocad and Autodesk software can be a better catalyst for introducing students to the software modules that do not come with vendor manuals.

## 53. Segmentation of Medical Images

*Amanda Dean, Howard University*  
*J. Zeng, Howard University*

Automatic segmentation of human organs (such as prostate or liver) or cancer in the medical images (such as MRI or X-ray images) is clinically significant but technically challenging. Accurate segmentation of an organ in a medical image enables a computer to construct a three-dimensional (3D) model of the organ and thus help a doctor to correctly estimate the size of the organ for transplant procedures. Segmentation of cancer images is critical to the doctors in identifying the cancer margins for planning a successful treatment intervention. Segmentation of medical images is difficult because human anatomy is complicated, and differentiation of different tissue types in an image is not obvious.

In this research, we are developing a software system for segmenting MRI prostate images by using a deformable Snake model. This model technique segments the target in the images by finding the largest change in intensity gradients. We use the Matlab system and a GVF Snake system to determine the most accurate boundaries of the urethras inside the prostate. The segmented urethra boundaries will be used for the construction

of 3D prostate models for the planning of prostate cancer surgery. We believe if we can segment the images on an automatic basis, the surgeons will have a better idea of how to operate on the prostate of the patients.

## 54. Silicon Germanium (SiGe) Hetero-Junction Bipolar Transistor (HBT) Physical Device Modeling

*Mooro El, Morgan State University*  
*Corey S. Dickens, Morgan State University*

Silicon germanium (SiGe) is a semiconductor material used to create low-power hetero-junction devices such as high electron mobility transistor devices and hetero-junction bipolar transistor (HBT) devices. This technology was chosen to be researched for a low-power analog to digital converter (ADC) for a NASA Goddard space application. The SiGe devices were obtained from the IBM HPE 0.5- $\mu\text{m}$  process. Since the devices are slated for a space mission, they had to go through reliability testing. NASA has performed reverse breakdown reliability experiments on these devices. For this work, computer simulations based on the SiGe devices from IBM using Silvaco Atlas will be investigated to reproduce the breakdown effects in SiGe HBTs in relation to time and temperature.

## 55. Polystyrene Nanoparticles Dispersed in Hydrogels Using Microfluidics Technology

*April Hollinger, Tuskegee University*  
*Tamara Floyd Smith, Tuskegee University*  
*David Baah, Tuskegee University*

This work reports a new technique that uses microfluidics technology for processing nanomaterials. Microchannels defined in poly-dimethyl siloxane (PDMS) using soft lithography distribute nanoparticles within a monomer solution. The solution is subsequently photo-polymerized to yield a polymer with dispersed nanoparticles, and microscopy techniques are used to characterize the material. Currently, polystyrene nanoparticles dispersed in a hydrogel have been investigated, but this technique should be applicable to other systems.

## Student Poster Presentation Session 2

*Friday, October 5, 2007 (3:30 pm –5:30 pm)*  
*Independence B & C*

## BIOLOGICAL SCIENCES

### 56. Production and Study of Amino Acid Mutations at the Cytochrome C Binding Site

*Zakiya Hoyett, Norfolk State University*  
*Francis Millett, University of Arkansas*  
*Lois Geren, University of Arkansas*  
*Marilyn Davis, University of Arkansas*

The purpose of this research was to study the rate of electron transfer by cytochrome c in the mitochondrial respiratory chain. Cytochrome c transfers electrons between Q-cytochrome c oxidoreductase and cytochrome c oxidase; however, this transfer occurs so rapidly that it is very hard to observe. In this experiment, lysine 13 of horse cytochrome c was mutated, grown (in bacteria?) by PCR amplification and purified. Lysine 13 was chosen because it is a key binding site between cytochrome c and cytochrome c oxidase. The binding activity of the mutants was compared to the binding of native cytochrome c by steady-state enzyme kinetics. Using ultraviolet-visible Chemstation Software, we attempted to determine and compared the KM and Vmax of the native cytochrome c to each of the mutants.



However, the results proved that the mutants had a huge affect of the rate of transfer, and accurate KM and Vmax could not be determined.

## 57. Quantifying the Expression of Pathogenesis-Related Genes in the Model Legume *Medicago truncatula*

Nicole Hunt, Fort Valley State University  
Deborah A. Samac, University of Minnesota

Expression of two genes encoding pathogenesis-related proteins, a thaumatin-like protein (TLP) and PR-10, was measured in transgenic *Medicago truncatula* plants, and their response to a fungal pathogen was evaluated. The plants contained trans genes encoding interfering RNA (RNAi) that may decrease expression of the TLP or PR-10 genes. The overall goal was to identify genes involved in disease resistance. When infected by the fungal plant pathogen *Colletotrichum trifolii*, both PR-10 and TLP are highly expressed, but their function is unknown. We hypothesized that if these genes are important for disease resistance, then the plants with a lower expression of either the TLP or PR-10 should be more susceptible to disease. Gene expression was measured in 74 plants (13 lines) using real-time PCR. Lines 1266-W62 and 1274\_T62b had the best downregulation. 1266-V69, 1266-V62b, 1266-V61 b, 1266\_T61, 1274\_T63, and 1274\_T66b all had a lower expression of the target gene. There was bad downregulation in lines 1266-V62a, 1266\_T62, 1274\_T67, and 1274\_T66c. In line 1274\_T66a, there wasn't a pattern in the expression of the target gene. Resistance to *C. trifolii* was analyzed using a detached leaf assay. The fungus was grown on potato dextrose agar and spores were spot-inoculated onto the leaves of RNAi *M. truncatula* plants and the response was recorded after 9 days. The control non-transformed plants had a resistant hypersensitive reaction. Many of the RNAi plants (86%) could not be evaluated because of contamination by epiphytic fungi. However, one RNAi line for the TLP and one RNAi line for PR-10 developed disease symptoms. These data suggest that PR10 and the TLP have a role in resistance to *C. trifolii* in *Medicago truncatula*. [This study was supported by USDA Capacity Building/NSF HBCU-UP grants awarded to Dr. Sarwan Dhir, PhD, Associate Professor and Director, National Science Foundation HBCU-UP, S-STEM, and REU Site Programs, Center for Biotechnology, Fort Valley State University, Fort Valley, GA 31030.]

## 58. Profile of Antiretroviral Therapies in the Treatment of HIV

Anitra Johnson, Johnson C. Smith University  
Tim Champion, Johnson C. Smith University  
Bao Truong, University of California

Since many HIV patients do not take their medications as they should, we compared the different regimens on the basis of efficacy, cost, and severity of side effects. Putting these criteria together will allow the HIV community to see which regimen a certain HIV patient can follow to ensure his or her health as well as commitment to the regimen. We found that the NNRTI-based regimens are more effective than the PI-based regimens in lowering viral load of patients within the first 48 weeks of treatment. Also there was no significant difference between the average cost of PI-based regimens and the average cost of NNRTI-based regimens. However, the PI-based regimens had fewer side effects than the NNRTI-based regimens. Overall, the NNRTI-based regimens will be more effective even though the cost would be about the same for each regimen for the HIV patient. Each individual HIV patient must decide whether he or she wants to endure the side effects or take medications that will allay the side effects.

## 59. Isolation of Sterol Biosynthesis Genes From Dinoflagellates

La'Keisha Johnson, Southern University at New Orleans  
Esther Francois, Southern University at New Orleans  
Matt Elrod-Erickson, Southern University at New Orleans  
Nancy Joseph (MTSU)

Dinoflagellates are a group of photosynthetic marine algae that are of interest because of the economic and environmental problems they can cause. When these algae grow to enormous numbers in ocean waters (forming "blooms") and produce toxins, they can kill fish and marine mammals, threaten human health, and hurt local economies. As part of a long term effort to monitor and perhaps control dinoflagellate blooms, we are attempting to better understand how these organisms synthesize sterols. Sterols are essential components of biological membranes and are useful as both biomarkers and as potential targets for drugs. Because the sterols produced by the dinoflagellate *Karenia brevis* are similar to those made by yeast, we hypothesize that many steps in the biosynthesis of dinoflagellate sterols will be similar to those used by yeast. Recent evidence suggests that *K. brevis* has at least 3 genes encoding enzymes in sterol biosynthesis pathway(s) that are related to equivalent genes (ERG6, ERG7, and ERG25) from yeast. To test if this similarity extends to other dinoflagellate species, we made efforts toward the isolation of these genes from 8 other dinoflagellate species. Large scale cultures of these organisms were grown and harvested. DNA and RNA samples were extracted from each species. Multiple sets of primer pairs were designed using software tools and the *K. brevis* sequences. Polymerase chain reaction (PCR) or reverse-transcriptase PCR (RT-PCR) was performed and analyzed via gel electrophoresis. Results indicate that the genomic DNA was an incorrect approach. Although little results were obtained, RT-PCR proved to be a better method for the isolation of these gene fragments.

## 60. Acute Exercise and Post-Exercise Blood Pressure in African-American Women

Madiha Khan, Howard University  
Vernon Bond, Howard University

Post-exercise hypotension, wherein arterial pressure decreases below the pre-exercise control value, is thought to contribute to the long-term benefits of exercise. Studies have suggested that physical activity in African-American women increases post-exercise blood pressure, an effect that would be counteractive to cardiovascular health. The purpose of this study was to evaluate the post-exercise blood pressure response to acute exercise in normotensive young adult African-American women. Eight healthy women (22.5 ± 0.9 years) performed a cycle ergometer bout of 30 min at 60% of VO<sub>2</sub>peak. Control arterial blood pressure, heart rate, lower leg blood flow, cardiac output, spectral analysis of blood pressure, and rate variability and baroreceptor sensitivity were measured for 5 min before exercise and were compared to post-exercise measurements performed at rest intervals of 15–20, 35–40, and 55–60 min after exercise. Exercise performed at 60% VO<sub>2</sub>peak produced arterial pressure of 172 ± 10/70.1 ± 4.0 mmHg. Post-exercise recovery blood pressure values were not significantly different than the baseline control values. These results do not support the hypothesis that acute physical activity exerts an adverse effect on post-exercise blood pressure in African-American women. Adiponectin (G276T)

# Abstracts

## 61. Polymorphism and Colon Cancer in the North Carolina Colon Cancer Study

Shannon Oliver, Johnson C. Smith University  
Temitope KeKu, University of North Carolina at Chapel Hill  
Rachel Holston, University of North Carolina at Chapel Hill  
Seun Omofoye, University of North Carolina at Chapel Hill  
Joseph Galanko, University of North Carolina at Chapel Hill  
Janie Peacock, University of North Carolina at Chapel Hill

Adiponectin is a protein secreted by adipocytes and is associated with improved insulin sensitivity and glucose and lipid metabolism. Adiponectin levels are lower in obese subjects than in lean subjects; thus, adiponectin is suspected to be a link between obesity and several cancers. Adiponectin has been implicated in the development and progression of several types of cancers including colon cancer. A polymorphism in the adiponectin gene, a G-to-T substitution at nucleotide +62 of intron 2 (276 G>T) has been reported. This T variant single nucleotide polymorphism is associated with insulin resistance and reduced plasma adiponectin. We are investigating whether there is a relationship between the adiponectin G276T polymorphisms and the risk of colon cancer. We hypothesized that low adiponectin is associated with decreased insulin sensitivity, which is linked to elevated BMI and increased risk of colon cancer. Participants in this study were enrolled in a population-based case-control study of colon cancer among African-Americans (191 cases, 276 controls) and whites (255 cases, 463 controls) in 33 counties of North Carolina. Controls were frequency matched to cases by race, sex, and 5-year groups. Lifestyle/diet information such as physical activity, anthropometric measurement, and other risk factors were obtained with the ABI Taqman 7700. The variant genotype frequencies did not vary significantly between cases and controls. The association between adiponectin G276T polymorphism and colon cancer were null in African-Americans and whites. Based on the results, the adiponectin G276T polymorphism did not appear to influence colon cancer risk. Comprehensive evaluation of adiponectin and other insulin resistance-related genes relative of colon cancer and diet/lifestyle are in progress. [The work was supported by the Howard Hughes Medical Institute (HHMI) (NCI P30 DK 034987, K01CA93654, P50 CA106991).]

## 62. Pregnancy-Associated Plasma Protein-A Structure and Insulin-like Growth Factor Binding Protein-4 Levels in Abnormal Pregnancy Sera

Julius Owens, Albany State University  
Oluseyi A. Vanderpuye, Albany State University

Pregnancy-associated plasma protein-A (PAPP-A) is a zinc metalloprotease whose concentration is greatly increased in normal pregnancy blood. PAPP-A proteolytically cleaves and inactivates insulin-like growth factor binding protein-4 (IGFBP-4), one of six IGFBPs that regulate activity of insulin-like growth factor-I. PAPP-A serum concentrations are decreased in pregnancies carrying fetuses with extra chromosomes (trisomies). We have hypothesized that 1) lowered PAPP-A levels in abnormal pregnancy sera may arise from the effects of structural changes in PAPP-A and 2) concentrations of IGFBP-4 in pregnancy serum may correlate with PAPP-A levels. Results are reported for 1) enzyme-linked immunosorbent assay (ELISA) measurement of paired PAPP-A and IGFBP-4 values in normal and abnormal pregnancy sera and 2) Western blotting analysis of sera by using monoclonal antibodies to PAPP-A's MBP subunit. For 13 different donor pregnancy sera involving fetal trisomies, 10 normal pregnancy sera, and 8 non-pregnancy sera, there was no correlation between concentrations of IGFBP-4 and PAPP-A. The MBP subunit of PAPP-A was detected in three of four normal pregnancy sera, zero of three sera involving trisomies, and zero of one non-pregnancy sera. Although IGFBP-4 is one of only two known substrates for PAPP-A protease, pregnancy sera IGFBP-4 concentrations were not correlated with those of PAPP-A.

Studies need to be performed with larger numbers of sera to see if these observations hold.

## 63. The Effects of Macroalgae on the Long Spined Sea Urchin *Diadema Antillarum*

Eddie Parish, University of the Virgin Islands  
Teresa Turner, University of Central Florida  
Linda Walters, University of Central Florida

Since the mass die-off of the herbivore *Diadema antillarum*, the black long-spined sea urchin in the 1980's coral reefs in the Caribbean have undergone a major phase shift, and in many cases, reefs are now dominated by macroalgae. In recent years, the sea urchins have grown greatly in numbers and may be significant enough to lead another phase change on reefs back to which corals would again be dominant. *D. antillarum* are known herbivores, but only recently has a preference in diet been examined, and results show that urchin grazing patterns depend largely on type of macroalgae present. Urchins were collected and tagged to identify each urchin. The urchins were then separated into either the control or experimental group, with each of those groups containing a high density group (5 urchins per .25 m<sup>2</sup>) or a low density group (1 per 2 m<sup>2</sup>). The control group was then placed on a rocky substrate with little algae present, while the experimental group was placed on high densities of *Dictyota* spp., *Caulerpa sertularioides*, or *Halimeda opuntia*. The movement of the urchins was then monitored every 2–3 hours, and the distance traveled was recorded. The urchins were monitored at night. *D. antillarum* appear to move less on *Caulerpa sertularioides* (between 1.5 and 2 m per night) than on the any other substrate. Urchins foraged approximately the same range on *Halimeda opuntia* and *Dictyota* spp., which was between 3.3 and 4.1 m per night. Urchins placed on a rocky substrate moved between 3.1 and 3.7 m per night on average. The results suggest that urchin grazing patterns are drastically affected by the type of algae present. Urchins are believed to be the key to a return to high coral dominance; however, if urchins do not return in high enough numbers, then perhaps the lack of competition will allow urchins to more particulars in their diet, thus not removing species of algae most fiercely competing with coral. Urchins travel greater distances when placed on *Dictyota* spp. or *Halimeda opuntia*, perhaps because they are not as palatable as other algae. Determining grazing patterns of *Diadema* based on the presence of algae may allow for a better assessment for the ability and likelihood of coral reefs to regain dominance in the Caribbean.

## 64. AP3 Complex and Leishmania Remodeling

Cieraca Rhodes, Winston Salem State University  
Johanna Porter-Kelley, Winston Salem State University  
Frankie Shaw, Jr., Winston Salem State University

Leishmaniasis is a human and animal disease caused by the protozoan parasite *Leishmania*. It is a major affliction in the tropical and subtropical world, including areas where U.S. soldiers currently occupy. One long-standing question in *Leishmania* biology is how the parasite transitions from one developmental form to the other. Recent studies have shown that this developmental transition occurs by protein and lipid synthesis and degradation, also known as cellular remodeling. Protein and lipid synthesis has been well characterized in eukaryotes; however, there is not much know about protein and lipid degradation. Trafficking to the lysosomes appears to be involved in the degradation process whereby proteins and lipids are degraded by transport to lysosomes. We are interested in unraveling the pathway by which these proteins and lipids are transported to the lysosomes for degradation. Based on our literature searches, the AP3 complex may play an important role in the transport process. Here we show the initial molecular characterization studies of the four components that make up the AP3 complex in *L. major* promastigotes.

## 65. Developing Artificial Seeds by Encapsulation of Valerian Embryos

Hussein Salifu, Fort Valley State University  
 Hari P. Singh, Fort Valley State University  
 Sarwan K. Dhir, Fort Valley State University

Valeria (*Valeriana officinalis*) is a hardy perennial flowering plant of medicinal importance. The traditional method of propagation is not very effective and is a serious obstacle for large-scale propagation. To address this, we used tissue culture techniques for developing artificial seeds. Somatic embryos for valerian were obtained from leaf explants through suspension culture. The somatic embryos thus obtained were encapsulated by using sodium alginate and calcium chloride to form artificial seeds. Different concentrations of sodium alginate (1, 1.5, 2.0, 2.5, and 3.0 mM) and calcium chloride (25 and 50 mM) were tested to see the effectiveness of encapsulation. In addition, gelling behavior was also monitored for these treatment combinations over time (10, 15, 20, and 25 minutes). The results indicated that all five concentrations of sodium alginate were able to produce encapsulated gel around the somatic embryos when used either with 25 or 50 mM calcium chloride concentrations. The exposure time for gelling has shown significant differences in hardness. The longer the exposure time, the harder the gel was found. Exposure of 25 minutes time has shown harder gel around each embryo in comparison to others. We intend to test the germination rate and viability after varying storage intervals. [This study was supported by USDA Capacity Building/National Science Foundation (NSF) HBCU-UP grants awarded to Dr. Sarwan Dhir, PhD, Associate Professor and Director, NSF HBCU-UP, S-STEM, and REU Site Programs, Center for Biotechnology, Fort Valley State University, Fort Valley, GA 31030.]

## 66. Initial Cloning and Sequence Analysis of the Switchgrass Chloroplast Genome

Jaslynn Slack, Southern University at New Orleans  
 Bruce Cahoon, MTSU  
 Kim Hinton, Siegel HS  
 June Kim, Blackman HS  
 Ryan Purcell, MTSU  
 Jaslynn Slack, Southern University at New Orleans  
 Jessica Webb, MTSU

*Panicum virgatum* is an indigenous North American grass that is currently a strong candidate as a cellulose source for bio-ethanol production. The purpose of this project was to begin the process of cloning and sequencing the chloroplast genome in an effort to create a genetic resource for a species where very little information is available. The process we followed was to first divide the genome into 60 fragments and assign each member of the group 10 pieces. Each member then PCR-amplified their portions, subcloned them into plasmid vectors, and end-sequenced each clone to positively identify each one. Once a clone was identified, the team member attempted to sequence as much of the clone as possible. Of the 60 pieces, 55 were successfully PCR-amplified and 40 were cloned and positively identified. The 40 clones cover an estimated 90,000 bases, of which ~60,000 bases have been sequenced at least once. The data presented is the culmination of a strong cooperative effort between five participants with very little prior knowledge of the processes and techniques employed over their seven-week program.

## 67. Expression Cloning of HIV-1 Vpu Basic Sequence and Destruction Domain

Tiffany Steele, Morgan State University  
 Kenneth P. Samuel, Morgan State University

The basic sequence of the Vpu protein of HIV-1 was selected for study to develop experimental strategies for analyzing its effect on a common cellular target, the CD4 receptor on the surface of helper T-cells. The main function of the Vpu protein is to promote increased release of mature HIV-1 virions from infected cells and prevent CD4 for proteasomal degradation. Two cellular proteins, beta-TrCP1 and Hos (beta-TrCP2), recognize and bind to the Vpu destruction motif, DSGNES, a crucial target in Vpu's basic sequence for therapeutic intervention. Binding of the beta-TrCP proteins is essential for Vpu's ability to degrade CD4 through the proteasomal pathway. Therefore, an understanding of how the beta-TrCP proteins interact with Vpu's basic region destruction motif is imperative if a method of inhibiting the degradation of the CD4 receptor can be devised. To achieve this goal, we first used polymerase chain reaction to amplify a 93-bp sequence encoding a 31-amino acid peptide of the basic region of the HIV-1 Vpu protein. The amplified 93-bp product was digested with BamH1 and EcoR1 restriction enzymes to make the 5' and 3' ends, respectively, sticky and was purified by gel extraction from a 1.5% agarose gel. The fragment was then ligated into the BamH1 and EcoR1 ends of the expression plasmid, pDsRed-C1, to generate a DsRed-VpuBasic fusion. The results of the cloning of the amplified 93-bp basic region of the HIV-1 Vpu protein into the pDsRed-C1 plasmid proved to be successful by DNA sequence analysis. The pDsRed-VpuBasic plasmid will be used in future studies by introduction into the U87-CD4 and HeLa-CD4 cell lines by transfection assays for 1) viewing expression, intracellular localization, and possible degradation of the DsRed-Vpu basic fusion protein by fluorescence confocal microscopy and 2) using immunoprecipitation analysis with antibodies to demonstrate specific interactions between beta-TrCP1, HOS (beta-TrCP2), and DsRed-VpuBasic protein. [This study was supported in part by a grant from NCCR-NIH RCMI #5G12RR 17581-01, awarded to Dr. Kenneth P. Samuel, PhD, director of Biotech Laboratory, Dixon Center, Room 206, Morgan State University.]

## 68. Functional Analysis of Protein Prenyltransferase of the Protein $\alpha$ -Subunit-Like (ppal) Gene

Safira Sutton, Fort Valley State University  
 Mark Running, Donald Danforth Plant Science Center  
 Qin Zeng, Donald Danforth Plant Science Center

The protein  $\alpha$ -subunit-like (PPAL) gene shows weak similarity with the prenyltransferase  $\alpha$ -subunit T-DNA insertion mutant. ppal-1 has much slower growth than wild-type, but the flower is normal and fertile. ppal-2 is more severe and infertile. RT-PCR shows ppal-1 has a truncated transcript, whereas ppal-2 has none. ppal-1 shows hypersensitivity to abscisic acid (ABA) inhibition of seedling greening during seed germination and also shows hypersensitivity to NaCl treatment. ppal-1 seeds germinate poorly in the dark, and addition of 1–2% sucrose promotes the germination in the dark and the greening after transfer to light. Gibberellic acid might promote ppal-1 germination in the dark, but further experiments need to be carried out to draw the final conclusion. PPAL has been shown to interact with the putative Rab GGT  $\alpha$ -subunit, RGTB1, through yeast two-hybrid systems. To study if PPAL is indeed a member of the prenyltransferase family and if so what type of prenylation activity it has, PPAL and RGTB1 were cloned into the pESC-HIS vector, with RGTB1 being tagged with the FLAG peptide. RGTB1 and RGTB1 were cloned in the same way to serve as a control. PPAL and RGTB1 were co-purified with RGTB1, respectively, using anti-FLAG resin, further suggesting that PPAL interacts with RGTB1 in vivo. Six times HIS tagged Rab escot protein (REP) cDNA was purified from *E. coli* strain Rosetta (DE3) using HIS-bind resin. GST tagged Rab GTPases, RabF2a, RabG3C, and RabA4B were purified using GST resin. In vitro prenylation

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shows that RGTA1 and RGTB1 have Rab GGT activity and can prenylate PGGT-I target AGG2 as well. PPAL has not shown any activity using the above-mentioned protein substrates, suggesting either these proteins are not the PPAL targets, or the assay condition is not appropriate for PPAL, or PPAL does not have prenyltransferase activity by itself. Rather, it might serve as a modifier for prenylation. [This study was supported by USDA Capacity Building/National Science Foundation (NSF) HBCU-UP grants awarded to Dr. Sarwan Dhir, PhD, Associate Professor and Director, NSF HBCU-UP, S-STEM, and REU Site Programs, Center for Biotechnology, Fort Valley State University, Fort Valley, GA 31030.]

## 69. Peptide Mass Spectroscopic Analysis of *Shewanella* sp. Proteome After Subcellular Fractionation and Two-Dimensional Gel Electrophoresis

*Kristen Wells, Jackson State University*  
*B.A. Wilson, Jackson State University*  
*Carol Giometti, Argonne National Laboratory*  
*Sandy Tollaksen, Argonne National Laboratory*  
*Candace Robertson, Jackson State University*

Microbes within the genus *Shewanella* are found in a variety of diverse environments. The most well-characterized species, from the perspective of physiology, molecular biology, and proteomics, is *Shewanella oneidensis* MR-1, originally isolated from Lake Oneida in New York. It is hypothesized that the relatedness of different *Shewanella* sp. strains can be elucidated by protein subcellular fractionation and HPLC-MS/MS chromatography coupled with LC-MS/MS. In this study, protein expression profiles of four different species of *Shewanella* will be used for comparative proteomics. It is anticipated that this study will provide valuable information on the distribution and/or localization of unique cellular proteins in vivo. Subcellular fractionation and 2DE of *Shewanella oneidensis* MR-1, PV-4, and S. ANA-3 whole cell lysates, outer and inner membrane preparations, periplasm, and cytosol was performed previously at the Argonne National Laboratory. Using only a small number of protein spot constellations, the 2DE patterns demonstrated that expressed proteins in subcellular fractions can be differentiated in different *S. oneidensis* species. Protein spots in DPPP, DOMP, and DIMP subcellular compartments that were unique in *S. PV-4* and *S. ANA-3* strains were identified in this study. Isolated protein spots were excised and analyzed by HPLC-MS/MS and LC/MS-MS. Of interest in this study is the potential identification of the genetic determinant of metal binding proteins in gram-negative *Shewanella* strain ANA-3 that may serve as a baseline for heavy metal bioremediation studies. We are presently using bioinformatics on isolated peptide sequences for database searches of metal binding motifs. This should allow us to generate a collection of proteins unique to subcellular compartments in *Shewanella* sp. with metal binding properties. [This work was partially supported by National Science Foundation (NSF) HBCU-UP #HRD-0411559, DOE-NSF Argonne National Laboratory (ANL) Biosciences Division, and the ANL Department of Educational Programs (DEP) Sponsored Faculty Sabbatical Leave Program.]

## CHEMISTRY & CHEMICAL SCIENCES

### 70. Microwave-Assisted Rapid Esterification of N-Acetyl Phenylalanine Using a Mukaiyama's Reagent

*Janet Cowins, Savannah State University*  
*Hua Zhao, Savannah State University*  
*Zhiyan Song, Savannah State University*  
*Olarongbe Olubajo, Savannah State University*

Amino acid esters are versatile intermediates for many synthetic reactions including peptide synthesis. Thus, they are of particular interests

to chemical and pharmaceutical industry. However, the esterification of amino acids is much more difficult than ordinary carboxylic acids mainly because of the zwitterionic structures. Conventional methods for esterification of amino acids suffered from low yields, long reaction times, and the use of expensive reagents. To find a rapid and simple esterification method, we investigated the esterification of N-acetyl phenylalanine with methanol using the Mukaiyama's coupling reagent. The product ester was purified and then characterized by IR: and nuclear magnetic resonance spectroscopy. We investigated the effects of several factors on the amino acid conversion, which included 1) microwave irradiation, 2) reaction time, 3) different solvents, and 4) different bases. We found that microwave irradiation is more effective in promoting the reaction than conventional reflux heating, 15 min is the optimum reaction time, methanol is a suitable solvent as well as the reagent, and 1-methylimidazole is the best base when compared with triethylamine and tributylamine. In summary, the modified Mukaiyama's esterification using microwave irradiation is more efficient, the base 1-methylimidazole is less toxic and more effective, and the side product of the base is a nonflammable and nonvolatile ionic liquid (1-methylimidazolium chloride).

### 71. Exploring the Effect of Microwaves on the Synthesis of Schiff Bases in Pre-Cooled Solvents

*Ofuje Daniyan, Morgan State University*  
*Yousef M. Hijji, Morgan State University*

This experiment explores the effect of microwave irradiation on the synthesis of Schiff bases. Furyl methyl amine and salicylaldehyde are reacted in hexane by cooling the mixture to  $-40^{\circ}\text{C}$  and allowing it to warm to room temperature. One sample was warmed using microwave irradiation and the other was not. Hexane was the selected solvent because of its ability to heat slowly. Hexane's heating speed was tested against the heating speeds of water, toluene, ethanol, chloroform, cyclohexane, and acetonitrile, and hexane was the slowest heating solvent in a microwave, which allowed more time for irradiation exposure before the reaction could reach room temperature. The samples were run in the gas chromatography mass spectrometer to see how much product was produced for each.

### 72. Observation in the Process of Separation of Cellulosic Material from Lignin in Sawdust by Scanning Electron Microscope

*Teresa Demeritte, Jackson State University*  
*S. Ford, Jackson State University*  
*A. White, Jackson State University*  
*J. Thorn, Jackson State University*  
*M. Begonia, Jackson State University*  
*Quinton Williams, Jackson State University*  
*Huey-Min Hwang, Jackson State University*  
*Ken S. Lee, Jackson State University*

Our research team reported the direct separation of cellulose and hemicellulose from sawdust with acetylation on sawdust in the ionic liquid. The separation gives a change in the shape of sawdust, and the visual observation of different samples was made with a scanning electron microscope. The sample was coated with gold and platinum metal under reduced pressure. Each sample was magnified to the resolution of 1  $\mu\text{m}$ . The picture of raw sawdust showed the clean surface. The grinding of sawdust also changed the shape. The picture of brown solid, which had not been dissolved in ionic liquid, was taken. It shows that the shape of the remaining part of sawdust after the reaction was like a leaflet. The difference in two pictures was noted. The dark brown powder, which solidified from the ionic liquid solution after separation, had a chunky shape.

**73. Binding of Copper(II) Schiff Base Complexes to DNA**

Lukmon Folarin, Winston-Salem State University  
Abdul K. Mohammed, Winston-Salem State University

We have used literature procedures to synthesize and characterize two copper(II)-Schiff base complexes, with potential nuclease activities. The DNA binding properties have been studied by spectrophotometric titration. We plan to investigate their nuclease activities by studying their plasmid DNA cleaving abilities using agarose gel electrophoresis

**74. Interaction of Molybdenum(VI)-Citric Acid in Aqueous Solutions to Mimic the Nitrogenase Cofactor**

Troy Greer, LeMoyne-Owen College  
Yahia Hamada, LeMoyne-Owen College

The chemistry of molybdenum(VI) (Mo6+) encounters very complex pathways even when reacting with the simplest of ligands (the aqua ligand). Citric acid (Cit) is considered to be a simple organic ligand. A di-hydrolytic complex of the Mo6+:Cit system has been detected using both a speciation computer program and the potentiometric titrations in aqueous solutions at 25°C. The speciation diagrams showed that the percent of formation of this di-hydrolytic complex species overshadows the percent of formation of the individual free citric acid species. The speciation program has taken into account the following species: the mononuclear species Mo(H-1Cit), Mo(H-1Cit)(OH), and Mo(H-1Cit)(OH)<sub>2</sub>; also, we have considered the dinuclear Mo<sub>2</sub>(H-1Cit)(OH)<sub>2</sub> complex. Among all complexes taken into account, only the di-hydrolytic complex Mo(H-1Cit)(OH)<sub>2</sub> has been detected in appreciable percentage. The UV-Vis titrations performed at different pH values are in good agreement with the chemistry literature. Further experimental and theoretical studies are needed in this area.

**75. Synthesis and Characterization of a Kläui Complex Containing Na{Cp'Co[PO(OC<sub>2</sub>H<sub>5</sub>)<sub>2</sub>]<sub>3</sub>}**

Michelle Malone, University of the Virgin Islands  
Surria James, University of the Virgin Islands  
Stanley L. Latesky, University of the Virgin Islands

The separation of actinide ions from complex chemical matrices is of importance in terms of radio-analytical chemistry. This work is part of an ongoing study involving the synthesis and characterization of materials that can selectively extract and concentrate radioactive nuclides from complex mixtures. The Kläui salt, Na{Cp'Co[P(O)(OEt)<sub>2</sub>]<sub>3</sub>} [Cp' = C<sub>5</sub>H<sub>4</sub>C(O)OCH<sub>3</sub>], was synthesized. The route chosen to synthesize the ligand is similar to that used in the original reported synthesis. The functionalized NaCp' used in the synthesis was prepared by reacting NaC<sub>5</sub>H<sub>5</sub> with dimethylcarbonate [CH<sub>3</sub>OC(O)OCH<sub>3</sub>]. This was then reacted with anhydrous CoBr<sub>2</sub>, forming [C<sub>5</sub>H<sub>4</sub>C(=O)OCH<sub>3</sub>]<sub>2</sub>Co (Cp'<sub>2</sub>Co), which was subsequently refluxed with diethylphosphite [HP(O)(OC<sub>2</sub>H<sub>5</sub>)<sub>2</sub>] forming {Cp'Co[P(O)(OC<sub>2</sub>H<sub>5</sub>)<sub>2</sub>]<sub>3</sub>}<sub>2</sub>Co. Reaction of the latter compound with air and NaCN in methanol resulted in the formation of the sodium salt Na{Cp'Co[P(O)(OC<sub>2</sub>H<sub>5</sub>)<sub>2</sub>]<sub>3</sub>}. The new Kläui ligand and its precursors were characterized using IR spectroscopy and mass spectrometry. Attempts were made to grow crystals of the product and precursors and to characterize them using single crystal X-ray diffraction; however, the structure of the intermediate indicates that the ester functional group was reduced by excess phosphate to a methyl group. Further studies will involve the oxidation of this methyl group to a carboxylate functionality. The ability of these ligands to selectively bind actinide ions has been previously reported in both liquid-liquid and solid resin-liquid extractions, where the ligand was weakly adsorbed onto the surface of an extraction resin. By functionalizing the Kläui ligand, we can then covalently attach the ligand to the polymer support, resulting in a more robust material.

**76. Direct Monitoring of Gold Nanorod Growth**

Davoy Murray, Albany State University  
Seong Seo, Albany State University

The versatile seed-mediated approach in aqueous surfactant solutions has been adopted in this study for the synthesis of gold nanorods. Gold nanorods have many potential applications because their longitudinal plasmon band is highly sensitive to their aspect ratio, and typically red-shifts to the near IR region as aspect ratio increases, but blue-shifts as aspect ratio decreases. These changes in the longitudinal plasmon resonance can be monitored using ultraviolet (UV)-vis absorption spectroscopy to determine the formation and extinction of gold nanorods in the synthesis. Unlike the use of strong reducing agents to make spherical gold nanoparticles, the growth of gold nanorods requires weak reducing conditions, leading to an unknown degree of gold reduction. Thus, cyclic voltammetry can be used to interrogate the redox chemistry of the gold seed and corresponding nanorods. This experiment describes the use of UV-vis absorption spectroscopy and cyclic voltammetry to monitor the growth of gold nanorods from gold nanoparticle seeds, as it relates to the desired shape and identity.

**77. Microwave-Assisted Synthesis of Near-Infrared Asymmetric Heptamethine Cyanine Dyes**

Emmanuel Mwangi, Morgan State University  
Angela Winstead, Morgan State University

Near-infrared (NIR) asymmetric dyes are used in DNA sequencing and also as sensitizers in several applications such as silver halide photography and xerography. Traditional methods of synthesizing asymmetric dyes, such as the reflux method, are successful in synthesizing the dyes. However, this method is very time-consuming; it could take over 12 hours before the dye was synthesized and uses benzene as solvent. This brought up the need for the development of a new method that is not only more time-efficient, but also practical in today's organic laboratory environment. The method that we developed uses a microwave-assisted organic synthesis (MAOS) and takes approximately six minutes to synthesize the asymmetric dye. To synthesize the asymmetric dye, a synthesized salt precursor, bisimine, and ethanol were combined in a microwave vial. The sample is irradiated in the microwave for two minutes at 160°C. A second synthesized salt precursor was added to the vial and irradiated for four minutes at 160°C. The product was purified using column chromatography with a 10–20% methanol-chloroform solvent. The  $\lambda_{\text{max}}$  of the product was determined to be 785.0 nm, which is characteristic of asymmetric dyes and we can tell that we have our product. The product yield range was determined to be 68–72%. <sup>1</sup>H nuclear magnetic resonance spectroscopy was used to determine the structure of our product. It was concluded that microwave-assisted synthesis can be used to synthesize asymmetric NIR-cyanine dyes in good yields. [This study was supported by NSF HRD-0627276 and DOE-DE-FG02-03ER63580, Morgan State University, Baltimore, MD 21251.]

**78. Synthesis and Photophysical Characterization of 2-Hydroxynaphthalene-1-yl (methylene) Hydrazinecarboxamide as an Anion Sensor**

Oyebola Oladeinde, Morgan State University  
Yousef Hijji, Morgan State University

Novel colorimetric sensor, 2-hydroxynaphthalene-1-yl (methylene) hydrazinecarboxamide 1, was synthesized in good yield by reacting 2-hydroxynaphthaldehyde with semicarbazide hydrochloride as shown in scheme 1. The purity and identity of compound 1 was confirmed by <sup>1</sup>H-NMR (nuclear magnetic resonance) and <sup>13</sup>C-NMR. The photophysical characteristic of compound 1 was studied by varying the concentrations of anions such as fluoride, acetate, dihydrogen phosphate, chloride, and

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bromide ions in acetonitrile. After the addition of the anions, only fluoride and acetate ions produced a significant color change, which was observed visually. Further testing of the sensor with bromide, chloride, and phosphate ions did not produce any color change. Ultraviolet (UV)-vis studies were carried out, and absorbance for compound 1 showed a peak at 362 nm, which shifted to 401 nm after the anions were added. Addition of the fluoride ion showed a decrease in its maximum at 362 nm and increase in the peak at 401 nm accompanied with a color change. The addition of the acetate and dihydrogenphosphate ions to compound 1 did show a less significant color change. The results observed were due to varying the concentrations at which the anions were being added to the compound synthesized. In conclusion, the semicarbazone synthesized is shown to be a colorimetric sensor for fluoride and acetate ions.

## 79. Synthesis of Single-Walled Carbon Nanotube/Polymer Composites

*Alisha Peterson, Alabama State University*

*Elijah Nyairo, Alabama State University*

*Nicole D. Gray, Alabama State University*

Chemical surface modification of carbon nanotubes (CNT) by carboxylic functionalization is important for their use in different applications. Potential applications are in aerospace, automobile, electronics, and packaging. Although the graphene-like sidewalls of CNT display high chemical stability due to resonance of the fused collection of benzene type rings, we report successful covalent sidewall carboxylic acid functionalization using acid treatments. Our goal is to develop a new class of polymer/CNT composites based on functionalized single-walled nanotubes (SWNT). The formation of a polymer/CNT covalent bond is expected to transform the smooth graphene-like nonreactive surface of the CNT into a hybrid material that has the characteristics of both CNT and polymer, with enhanced solubility and good uniform dispersion. This study demonstrates a novel approach to prepare SWNT-polymer interface by using SWNT chemistry.

## 80. Chromatographic and Nuclear Magnetic Resonance Analysis of 4-Chloro-1,2-Phenylenediamine and Its Photoproducts

*Keonia Smith, Jackson State University*

*Shuguang Wang, Jackson State University*

*Germerique Stewart, Jackson State University*

*Hongtao Yu, Jackson State University*

4-Chloro-1,2-phenylenediamine (CPD) is an aromatic amino compound used as an active ingredient for the production of hair dyes. When exposed to ultraviolet light, CPD is known to be mutagenic in bacteria. It is theorized that the photochemical reaction and the associated reactive species are the two factors responsible for the phototoxicity of CPD. Therefore, the photochemical reaction of CPD is investigated. CPD was dissolved in water (50 mg in 200 mL with 1% methanol) and irradiated with a solar simulator lamp (Suntest, 1500 W Xe Lamp with light output intensity of 250 J/cm<sup>2</sup>). The CPD solution was irradiated for 5 hours, and about 90% of the original CPD disappeared. One main photoproduct was detected by both high-pressure liquid chromatography (HPLC) and thin-layer chromatography (TLC). The solution was then freeze-dried and a brownish solid photoproduct mixture was obtained. The brownish photoproduct was placed on a silica gel column for separation. The solvent system consisted of 70% ethyl acetate and 30% hexane. The solvent was removed by evaporation, and a solid product was collected. The product had a molecular mass at *m/z* 244 (100%) and an isotope ion at 246 (30%). This molecular mass indicates that the product is likely dimerized, since CPD's molecular weight is 142.6, and the isotope ratio of 3:1 for ions 244/246 indicates that only one chlorine atom remains in the photoproduct. <sup>1</sup>H-NMR (d<sub>6</sub>-DMSO) was performed on a 300-MHz Bruker NMR (nuclear magnetic resonance). The

results match the previously published NMR spectra for 2,3-diamino-7-chlorophenazine, C<sub>12</sub>H<sub>9</sub>N<sub>4</sub>Cl. [We thank the National Institutes of Health for financial support (NIH-SCORE So6GM08047) and equipment use in the Core Research Laboratory through the NIH-RCMI grant. G.S. wishes to thank the Department of Education for the financial support through the Title III grant.]

## 81. Elution of Tightly Bound Solutes from Concanavalin A Sepharose: Factors Affecting the Desorption of Cottonmouth Venom Glycoproteins

*Anastasiya Soper, Norfolk State University*

*Steven D. Aird, Norfolk State University*

Some glycoproteins bind so tightly to concanavalin A (Con A) that common elution techniques are ineffective and many authors report low yields. When cottonmouth venom phosphodiesterase proved difficult to recover from this resin, a systematic exploration of factors affecting stubbornly bound solutes was undertaken. Glycoprotein desorption from Con A is greatly improved by introducing one or more pauses into the elution step. Yield shows a sigmoid relationship with the number of pauses. Increased pause length  $\leq 20$  min also improved the yield. Optimal eluent concentrations were 250 mM methyl-glucoside and 500 mM methyl-mannoside. Further increases in pyranoside concentrations reduced the venom glycoprotein yield. NaCl in the elution buffer diminished the amount of venom glycoprotein desorbed. Most venom glycoproteins elute more readily as the pH diminishes from 6 to 4, but PDE shows the opposite pattern. Eluents recommended by the supplier for desorbing solutes or for column cleaning were ineffective.

## 82. Effect of c-Myc Proto-Oncoprotein on Gastrin Promoter Activity

*Cynetta Sturghill, University of Arkansas at Pine Bluff*

*Patricia A. Marks, University of Arkansas at Pine Bluff*

Gastrin is a potent polypeptide mitogen released from the G-cells in the antral region of the stomach. Mechanisms for gastrin gene regulation in the whole animal are not clear. The sustained and exaggerated plasma gastrin level observed during *Helicobacter pylori* (HP) infection that increases the risk for gastric and colorectal cancers is likely due to changes in gastrin gene expression, rather than a change in G-cell number. The gastrin promoter contains the consensus sites for a variety of transcription factors, which include the E-box that can bind the c-Myc proto-oncoprotein complex. This study evaluated the gastrin promoter activity involved in c-Myc proto-oncoprotein-dependent signaling mechanisms. Expression vectors created in the laboratory that contain the c-myc cDNA in the sense or antisense orientation were used to vary the c-Myc proto-oncoprotein level within gastric adenocarcinoma (AGS) cells. Gastrin reporter constructs and c-myc expression vectors were co-introduced into the AGS cells by electroporation. The gastrin reporter constructs, which contain gastrin promoter sequences and the first exon linked upstream of a promoterless luciferase reporter gene, were used to evaluate whether gastrin promoter activation and c-Myc levels were positively correlated in stimulated AGS cells via luciferase assays and Western blotting. This study is important, since it suggests a functional role for c-Myc proto-oncoprotein in the signaling mechanisms that are recruited during HP associated hypergastrinemia capable of upregulating the gastrin gene. [This study was supported by grants from the National Institutes of Health, NIH 3 P20 RR16460-05, and NBREPartnerships for Biomedical Research in Arkansas.]

### 83. New Cytotoxic Metabolites from the Virgin Islands' *Pseudoceratina crassa*

*Digna Washington, University of the Virgin Islands*

*Omar E. Christian, University of the Virgin Islands*

*Nailah Brandy, University of the Virgin Islands*

In 2004, it was estimated that over 1.3 million Americans were diagnosed with various forms of cancer; of this number, in excess of 560,000 have died from the disease. Natural products, natural product-derived drugs, or natural product-inspired drugs account for the vast majority of chemotherapeutic agents currently in clinical use. In recent years, marine sponges have been established as a sustained source of biologically active and biosynthetically diverse natural products. Sponges of the order Verongida are known to produce interesting and biologically active bromotyrosine derivatives. Recent discoveries include psammaplins isolated from Verongida, which exhibit potent HDAC (histone deacetylase) and DNMT (DNA methyltransferase) activity. As a result, several synthetic psammaplin-inspired compounds are currently in phase I clinical trials against hematological malignancies. As a part of our ongoing search for novel anticancer drugs from Virgin Island sponges, extracts of *Pseudoceratina crassa* are currently under investigation for cytotoxicity using the standard brine shrimp assay. The potent cytotoxicity observed at the crude extract level is not surprising, as *Pseudoceratina* is a prolific producer of the extremely cytotoxic psammaplins. Chromatography of the extracts of *P. crassa* has yielded several pure cytotoxic fractions. The identity of these metabolites will be elucidated based on 1D and 2D nuclear magnetic resonance spectroscopic studies. In addition, the bioactivity data obtained from the brine shrimp and antimicrobial assays will be discussed. [This study was supported in part by a grant from the National Institutes of Health/MARC.]

### 84. Hygrothermal Stability of Layered Double Hydroxide/Nafion Nanocomposites for High Temperature Fuel Cell Applications

*Elizabeth Williams, Howard University*

*D. Raghavan, Howard University*

*B.A. Abayomi, Howard University*

*I.B. Elkina, Howard University*

Sulfonated perfluorocarbon polymers, such as Nafion, currently used as proton exchange membranes, exhibit poor performance at elevated temperatures and in low humidity conditions. To address this drawback, the development of Nafion membranes with synthetic clay as nanofillers was proposed. Layered double hydroxides (LDHs) are very attractive synthetic clays for the preparation of polymeric membranes because of their excellent mechanical and thermal properties and rich chemistry. Magnesium-aluminum (Mg-Al)-based LDHs with 3:1 Mg<sup>2+</sup>/Al<sup>3+</sup> ratios were prepared by the co-precipitation method and modified with perfluorooctane-sulfonic acid tetraethylammonium salt (PFOSA). The modified LDH was dispersed in 20 wt% Nafion solution using sonifier, and films were cast by drying the solution on a release film. The water sorption-desorption kinetics of nanocomposite films [.30 mm] with filler loading of 1 wt% LDH/PFOSA were evaluated at 25°C, 55°C, and 85°C at 100% RH. The nanocomposite membranes exhibited higher water retention than pure Nafion at 25°C, 55°C, and 85°C. A more comprehensive study is underway to evaluate the performance of different nanocomposite membranes as a function of temperature and clay loading.

## COMPUTER SCIENCES & MANAGEMENT INFORMATION SYSTEMS

### 85. Computer Visualization Algorithms for Proteomic Studies in Cancer

*Latoya Cox, Virginia State University*

*Giti Javidi, Virginia State University*

*Larren Bryan, Virginia State University*

In this work, data visualization for genomics and proteomics (DVGP) models have been studied to test the hypothesis that certain biological realities can be modeled by analyzing complex data and using simple biological laws. The goal is to provide a broad overview of a genomic or proteomic problem raising interesting questions to the data visualization community. This research addresses important techniques for the interpretation of data originating from multiple sources, encoded in different formats or protocols, and processed by multiple systems. Through a systematic overview of the problem of biological data integration using computational approaches, this work provides the basis for the development and application of integrative visualization methods to analyze biological data on a systemic scale. DNA microarray hybridization technology allows probing fluorescently tagged cDNA copies of mRNA from a single sample with thousands of DNA targets or synthetic oligonucleotides simultaneously. Gene expression levels can now be monitored on a genomic scale. These new data promise to enhance fundamental understanding of life processes on the molecular level and may prove useful in medical diagnosis, treatment, and drug design. Analytical and visual tools are required to detect and model the decision-making processes of genetic networks. Owing to the major role played in genomics by transcriptional signaling and the related pathway modeling, it is only natural that the theory of signal processing and data visualization should be used in both structural and functional understanding. In particular, DVGP aims to integrate the theory and methods of data visualization with the global understanding of functional genomics, with special emphasis on proteomic regulation.

### 86. Hierarchical Clustering Using the Sine Dissimilarity Measure for Consolidated and Distributed Data Sets

*Phillip Hayes, Norfolk State*

*Eduardo Socolovsky, Norfolk State University*

Cluster analysis is a key technique in which measures of similarity or dissimilarity are used to classify or find patterns in data. Data from engineering, scientific, or commercial applications are often intrinsically heterogeneous high dimensional and stored partitioned into distributed data subsets kept at distinct sites that are only connected by a network. The long-term project consists of the implementation of a hierarchical algorithm to cluster such data sets and obtain a "global" dendrogram. The approach is to cluster the whole distributed data set using the "local" dendrograms built by clustering the local data subsets where they are stored. We first implemented and tested a new hierarchical clustering algorithms for the "local" data sets using the new "sine" measure for high dimensional data. Our C++ programs compute the sine dissimilarity matrix and build the dendrogram, which is later graphed by a recursive program. We also designed and programmed an algorithm to synthesize test data with predetermined results, by generating random vectors around  $e_1$  and applying a Householder Transformation.

### 87. Firewall Network Security

*James Haywood, Jr., Mississippi Valley State University*

*Timothy Holston, Mississippi Valley State University*

This project was based on testing the security of the network firewall rule changes. There were three basic key points that were mandatory to inves-

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tigate the security of the network firewall rule changes, which were the collection of data, the network firewall rule change test, and the results. The collection of data consisted of four subunits of research. These subunits were the approver (process owner) of the change, the person who gained the access by the approver, reason for the firewall rule change, and the recent status of the changed firewall rule. In gathering the data, a sample selection is acquired through the total amount of network firewall rule changes. The testing part of the project consists of analyzing the verification of the necessary approvers, the person granted access to make the change, documentation for the reason of change, and current status report are all acquired from samples picked. To test the firewalls, a sample portion of the data was collected. The tool used to conduct the test was the auditor-type toolkit, which allows template of a testing sheet that compiles all necessary verification into a spreadsheet. The results of the network security firewall test were base on the finds of actual testing. If any data were missing from the acquired sample, the process owner of the firewalls intrusion detection was notified and had to find the missing data. If the process owner couldn't find the missing data, then the firewall rule change was reverted.

## 88. Enhanced Mississippi Gulf Coast Evacuation Routes

*Andre Johnson, Jackson State University*  
*John Young, Jackson State University*  
*Robert L. Hughes, Jackson State University*

The Mississippi Department of Transportation has identified and mapped both major and secondary coastal emergency evacuation routes from the Mississippi Gulf Coast. However, published maps lack detailed information depicting the location of hospitals, gas stations, emergency shelters, etc. This geographic information system (GIS) project will enhance the evacuation maps by adding the locations of these critical features and other useful information about the evacuation routes. If an evacuation from the Mississippi Gulf Coast is required, evacuees will have access to better maps and information, resulting in a more organized and efficient evacuation.

## 89. Voice-Over Internet Protocol

*Ashley Johnson, Spelman College*  
*Ray Gilstrap, NASA Ames Research Center*

Voice-over Internet Protocol, or VoIP, is a system for placing phone calls over the Internet. Analog phone signals are converted to digital Internet protocol (IP) packets that are sent over the Internet. VoIP systems are good because they reduce the cost of phone calls by making long distance calls free. NASA can make extensive use of VoIP in areas that may not have access to phone lines but do have access to the Internet. Calls can be made to astronauts exploring the lunar surface quickly through VoIP. Asterisk is free software for placing phone calls using IP phones or analog phones and makes use of a computer. It requires a regular telephone, a standard Internet connection, and telephone interface ports that can convert the analog signals to digital, which is cheap and easy to obtain. To set up Asterisk, we installed a Linux server to a computer. After installing Asterisk and its complementary software, we had to configure the software using the many configuration files included in the program. We then tested the configuration using analog and IP phones. Once the phones were able to send and receive calls, they were ready to be used. Researchers in Panama are currently making use of the IP phones and Asterisk. IP phones provide the advantage of being configured miles apart from the server. Access to VoIP technology is crucial because regular cellular and landlines may become unavailable at any time. VoIP is proving to be a useful tool as it continues to develop. Although VoIP has problems that come with any technology that works through the Internet, different methods of sending the digital signals through the Internet are being enhanced to further improve the quality of VoIP calls.

## 90. Fine Tuning the C4.5 Algorithm to Classify Coral Reef Health

*Javier Navarro, University of the Virgin Islands*  
*Marc Boumedine, University of the Virgin Islands*

Various data mining algorithms have been studied to classify coral reef health based on environmental stressors such as water salinity, sea temperature, light intensity, etc. One important aspect of data mining algorithms is to fine-tune the learning parameters that will permit increase classification accuracy rates. This research focuses on the learning parameters of a specific classification algorithm family: decision trees. We will be comparing various sets of modified parameters to determine which combination of learning parameters in each case gives the highest percentage of correctly classified instances. Experiments use the National Oceanic & Atmospheric Administration's Coral Reef Early Warning System 2005 data sets.

## 91. Implementation of LaTeX in the Under the Cygwin Unix Emulation Layer for the Windows NT File System Environment

*Dornesia Ward, Alabama State University*  
*Timothy Holland, Alabama State University*

LaTeX is an advanced Markup Language documentation preparation system based on TeX and used in mathematics and computer science to create professional publications. It enables the user to insert various commands to simplify complex typesetting, allowing concentration on content rather than formatting commands. The problem with LaTeX is that there are many expensive commercial versions, unlike the open source version that is free under Linux. The purpose of this project is to demonstrate the feasibility of LaTeX under Windows using Cygwin as a suitable open source replacement for similar commercial analogs and to demonstrate the academic applications such as test generations and publications. Any text editor can be used to create LaTeX code. All LaTeX codes have the suffix .tex. Once a LaTeX code is created with a file name foo.tex, it can be compiled under the Cygwin prompt with the command latex foo.tex. The compilation will create a viewable typeset file called foo.xdvi, which can be displayed under Cygwin by typing xdvi foo.dvi. In Cygwin, foo.dvi can be converted to PDF, a suitable and portable format, by using the command dvipdf foo.dvi foo.pdf. The PDF file can be viewed using the Adobe Reader. After creating a latex file foo.tex, latex.exe, xdvi.exe, and dvipdf.exe are the only three executable commands needed to compile and view a LaTeX file. In conclusion, LaTeX can be effectively deployed under Windows operating system using the open source Cygwin Unix emulation.

## 92. An Aggressive Programming Technique

*Daryl White, Morgan State University*  
*William Lupton, Morgan State University*

Considerable research has been done in the development of various programming languages, but little research has been done on the comparison of programming methodologies. There has not been a programming methodology that addresses the problem-solving aspect in detail or whether or not the concept of programming from the inside-out, as we call it, is more effective than programming from the outside-in. In detail, programming for the inside-out means to develop a program from its inner-most being, finding out the main problem and then filling in the rest of the information to make that program work as wanted instead of starting from the first line in the program, for example, the pre-directories and variables. We took four different programming problems, two of each pair with the same difficulty and type, and timed the programming process that it took to reach a solution—one program using the inside-out method and the other program using the outside-in method. The results where as hypoth-



esized: it took more time and we ran into more obstacles when programming from the outside-in rather than programming from the inside-out. With these results, we concluded that programming from the inside-out is a better practice than programming from the outside-in and therefore can be included in our developed methodology. Then we combined various problem-solving practices and previous programming techniques to our methodology to come upon a solution that would prove helpful in a fast-paced or competitive environment. [This research was supported by NSF-HRD 0506066 Historically Black Colleges and Universities Undergraduate Programs (HBCU-UP).]

## PHYSICAL & MATHEMATICAL SCIENCES

### 93. Implementing Computer-Based Data Collection Into Lower-Level Physics Laboratory Curricula

*Fabrian Keels, Virginia State University*

*Colleen Taylor, Virginia State University*

*Florence Etop, Virginia State University*

Standard methods for lab studies have become less helpful for undergraduate students because of the overall ineffectiveness of the equipment, and students are falling at a disadvantage, for they often cannot accurately reflect what is learned in lecture in the laboratory experiments. Through the laboratory computer program Logger Pro, students are provided with instruments that allows for the collection of real-time, accurate data, which leads to the successful calculation and reflection of laboratory objectives. Thus, a gradual conversion from the previous system of manual collection to a technology-based technique provides for a more successful laboratory experience.

### 94. DMT Forecasting Models for Number of New Dillard Students after Hurricane Katrina

*William Meeks III, Dillard University*

*Hong Dai, Dillard University*

This research is to try to help our Dillard administration make a better decision with regard to the number of new incoming students. When the random fluctuations caused by the large irregular components, such as Hurricane Katrina hitting New Orleans, the regular smoothing empirical method cannot be nicely applied to predict the number of new incoming students. The objective of this research is to try to find a method to "smooth out" the random fluctuations caused by the large irregular components. By adding four adjustable factors, we create a DMT Forecasting Model to predict the number of new incoming students. These adjustable factors in our DMT model include Financial Aid Percentage ( $P_f$ ), Recovery Completion Rate ( $P_r$ ), Hurricane Hitting Chance ( $P_h$ ), and Recruitment Effort Percentage ( $P_e$ ). This method was used to predict the number of new Dillard students in year 2006 (after Hurricane Katrina for a year). The result is very satisfactory.

### 95. Mössbauer Effect Studies on a Neutron-Irradiated High Temperature Superconductor

*Lauren Scott, Morgan State University*

*Frederick Oliver, Morgan State University*

*Dr. Dereje Seifu, Morgan State University*

*Dr. Anthony Kinyua, Morgan State University*

*Abebe Kedebe, North Carolina A&T State University*

High-temperature superconductors are materials whose resistance goes to zero at relatively high temperatures ( $\sim 83^\circ\text{K}$ ). There are many possible applications for these materials. A recent edition of the Wall Street Jour-

nal stated that Consolidated Edison is planning a \$36.3 million upgrading of the electric system and installing state-of-the-art superconducting electrical cable in midtown Manhattan. The effects of radiation on superconductors are of interest to NASA where superconductors may be used for possible space applications and where they will be exposed to cosmic radiation. Scientists are also interested because irradiation is known to affect the properties of superconductors. Previous studies have used the Mössbauer effect and  $^{57}\text{Fe}$  to investigate the effects of radiation on Fe-based materials in general. This study used the seldom-used Mössbauer isotope  $^{151}\text{Eu}$  and looked to see if any changes would be detected at the europium site in a neutron-irradiated europium-based superconductor. A measurable line broadening was observed that is attributed to the displacement of the europium atoms from their normal lattice site to some vacant positions available in the lattice structure. These and other results are discussed and compared with previous experimental measurements on Fe-based radiated materials. [This study was partially supported by the NSF-HRD 0506066 Historically Black Colleges and Universities Undergraduate Programs (HBCU-UP).]

### 96. Filling Iron and Iron Cobalt into Vertically Aligned Nanotubes Using DC Sputtering

*Malachi Tatum, Morgan State University*

*Dereje Seifu, Morgan State University*

Nanomagnets and nanowires are essential components in a NEMS (nanoelectromechanical system). However, a viable method for their creation is still unreliable. It is well known that nanocolumns are formed during oblique deposition; but the aid of a template, such as multi-walled carbon nanotubes (MWCNTs) grown vertically on a substrate, will be useful in attaining well-ordered nanocolumns useful for several applications within NEMS. The goal of this experiment is to determine if DC sputtering will be useful to fill MWCNTs. In this high-yield filling of multi-walled carbon nanotubes with magnetic nanoparticles, Fe and FeCo disks will be used as targets in a DC sputtering chamber. MWCNTs grown vertical on an  $\text{SiO}_2$  substrate by the CVD (chemical vapor deposition) method with open tips will be used as substrate and thus filled with Fe and FeCo. The shape anisotropy of the Fe and FeCo grown by sputtering inside of MWCNTs will be compared with nano-columns of Fe and FeCo grown by oblique sputtering on polymers and MgO substrates. Samples will be characterized using  $^{57}\text{Fe}$  Mössbauer spectroscopy, a vibrating sample magnetometer, and a scanning electron microscope. The results from the scanning electron microscope suggest that carbon nanotubes were filled; and EDX (energy dispersive X-ray) verifies that the MWCNTs were indeed filled with the Fe nanoparticles. The nanotubes must undergo further testing, via the vibrating sample magnetometer, to determine how much of the nanotube was filled with the Fe from the target. Based on part of the project that is completed, we conclude that DC magnetron sputtering is a viable method to fill MWCNTs. [This study was supported in part by a grant from NSF-HRD 0506066 Historically Black Colleges and Universities Undergraduate Programs (HBCU-UP).]

### 97. Modeling Excitations Energies of Phenylene-Vinylene Oligomers for Solar Cell Materials

*LaTonya Waller, Norfolk State University*

*Suely M. Black, Norfolk State University*

Organic materials have been targeted for use in electronic and photonic technologies. Organic-based devices offer many benefits because of their unique properties that exhibit semiconducting behavior and because they are flexible and light-weight plastics. The geometries and bandgaps of methoxy- and sulfone-substituted polyphenylene-vinylene molecules have been studied using the B3LYP density functional theory method with a 3-21G\* basis set. The influence of substituent on the bandgaps and the

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benefits of theoretical experimentation on expected structures before synthesis are discussed.

## TECHNOLOGY & ENGINEERING

### 98. Importance of Structure Configuration Systems to Resisting Applied Loads

*Morris Johnson, Savannah State University*  
*Mohamad Mustafa, Savannah State University*  
*Willie Wilkerson, Savannah State University*

The purpose of this study is to illustrate the importance of structure configuration systems to resisting applied loads. Determinate and indeterminate bridge truss models are compared to study their strength in resisting deformation under specific loading. This study includes setting up the H-6320 structures test system, conducting the test of the determinate and indeterminate trusses, and collecting tests data. Excel is used to analyze the collected data by generating load versus deformation graphs for the two models to determine which system configuration is more efficient in resisting the largest load with the least amount of deformation at its central point. The pressure was applied to the determinate truss in an increment of 100 psi up to a maximum of 700 psi. The pressure values and their corresponding deflection are shown in the table below:

P (psi)	F (lbs)	Δ (in)
0	0.0	0.000
100	34.4	0.000
200	68.8	0.001
300	103.2	0.002
400	137.6	0.004
500	172.0	0.005
600	206.4	0.008
700	240.8	0.010

For the indeterminate truss, the pressure was applied in an increment of 1,000 psi up to a maximum of 10,000 psi. The deflection values for the corresponding applied stress were recorded as shown in the table below:

P (psi)	F (lbs)	Δ (in)
0	0	0.000
1000	344	0.004
2000	688	0.010
3000	1,032	0.016
4000	1,376	0.022
5000	1,720	0.028
6000	2,064	0.034
7000	2,408	0.040
8000	2,752	0.047
9000	3,096	0.053
10,000	3,440	0.059

In conclusion, we discovered that the indeterminate bridge truss configuration resists a far much larger force and produces a very small deformation compared to the determinate truss configuration. For example, the force that produces 0.01 inches deflection in the indeterminate truss configuration is 688 lbs; while it takes only 241 lbs to produce the same magnitude of deflection in the determinate truss configuration. That is an increase of approximately 185% in loadings. Therefore, if deflection is a main criterion in a design situation, an indeterminate configuration of the truss would be desirable.

### 99. A Prototype Ambulatory Patient Electrocardiogram Monitoring System

*Elijah Lowe, Morehouse College*  
*Desmond Murray, Morehouse College*  
*Kenneth R. Perry, Morehouse College*

Current patient electrocardiographic monitoring systems require the patient to be wired to an electrocardiogram machine. WiFi patient monitoring systems have been introduced, but WiFi areas are limited. We present a prototype of an ambulatory patient monitoring system that uses the cell telephone network to allow the patient to roam about un-tethered while being constantly monitored. We designed, implemented, and tested a

biotelemetry system. We wrote software to implement the transmit and receive, buffer, encode, and decode physiological signal processing and display of the results. We present a wireless communications application that transmits physiological signal parameters to a base station. We will demonstrate the ability of the base station to process the raw data and transmit information back to the patient's personal communicator when necessary. We will use this platform as a framework to investigate ways of increasing the reliability of the communications system, the physiological signal processing algorithms, and the benefits of long-term continuous patient monitoring. A major issue is reliability. We discuss the design of algorithms to program a controller that shows the patient when a connection is dropped and an automatic redial feature.

### 100. Development of a Graphical User Interface for Z-Score Standardized Assessments

*Stephanie Parker, Morgan State University*  
*Kemi Ladeji-Osias, Morgan State University*

The goal of this project is to develop a graphical user interface (GUI) to rank participants in research symposiums. The ranking is achieved by converting the raw score to a z-score. The z-score can be defined as a statistical measure that quantifies the distance a data point is from the mean of a data set. It is used in mathematics, engineering, and science for data analysis. In this project, the z-score is used to develop rankings of student presentations when each student may have a different number of judges. The z-score was calculated by subtracting the judge's mean score from the student's individual score and dividing the difference by the standard deviation. A negative z-score indicated that a student performed below the judge's average, while a positive z-score meant the student performed better than average. Once the z-scores were determined, the average of all of a student's z-scores was computed. The final ranking of each student was based on their average z-score. All computations and GUI development occurred in MATLAB, a mathematical modeling tool. A MATLAB m-file was created to import and export data between MATLAB and Microsoft Excel. The software developed has been successfully tested using data from student presentations in the school of engineering.

### 101. Clinical and Spectroscopic Investigations of Laser Tissue Ablation

*Khadijah Ransom, Dillard University*  
*Abdalla Darwish, Dillard University*

A pulse laser ablation (PLA) technique was used in this study to determine the feasibility of treating skin cancer with a high-pulse CO<sub>2</sub> waveguide laser. PLA is generally used in the fabrication of thin film wave guides, but in this research, PLA was used to do the opposite; so instead of the deposition of materials, it will be removing cancer cells. Preliminary results involve the determination of the optimum laser power, exposure time, and the depth of the crater caused by the PLA. A polymeric thin film was used as a model substrate for the laser exposure, and then a cow liver was used to test the results. No clinical work was done at this stage of the preliminary study. The results showed a strong potential of using laser ablation in cancer clinical treatment.

### 102. The Road of the Ring: Effect of the Ring on the 100-m Sprinter's Record

*Timothy Ransom, Savannah State University*  
*Hyounkyun Oh, Savannah State University*

As a part of qualitative biomechanical analysis, this research concerns the investigation of the effect of delivering the ring to the 100-m sprinter's records. Through the observation of video files of a 100-m sprinter's running

the data for left ring finger's position where the ring is placed, is produced in the 0.001 time interval along about 10 seconds in the three-dimensional space. Mathematical interpolation theory replaces this discrete data with smooth trajectory functions in the x-y-z coordinate system. Then the velocity and acceleration functions are used to get the travel distance of the ring and the work done to deliver the ring. Approximate smooth functions are obtained through the cubic spline interpolation instead of relatively simple polynomial approximation due to the oscillation properties of data. Then the total travel distance of the ring is obtained by using the arc length formula in the three-dimensional spaces. The work done is also calculated under the assumption that the mass of the ring used is 19 g, which is exactly the same as the one in the movie *The Lord of the Rings*. Under the generally designed environment, the total work done for runner's completion of a 100-m race is estimated numerically to compare with other exercises or the amount of popular foods. For a more exact effect on the splinter's new record, the directions of the future research are suggested.

### 103. Remote Sensing of Flood Damage Assessment

*Faith Rodman, Virginia State University*  
*Ehsan Sheybani, Virginia State University*  
*Yohance Campbell, Virginia State University*

Extensive imagery was acquired by the National Oceanic & Atmospheric Administration (NOAA) Remote Sensing Division from the Gulf coast of Louisiana after Hurricane Katrina made landfall. In this work, image databases have been studied to test the hypothesis that ongoing research efforts for testing and developing standards for airborne digital imagery support NOAA national security and emergency response requirements. Remote sensing technology was applied by using satellite images. The results are reported on the techniques developed for detecting and quantifying hurricane-related coastal and urban flooding from Katrina. The study is conducted using images that are uncorrected and not rotated. The approximate ground sample distance (GSD) for each pixel is 37 cm (1.2 feet). The images have 60% forward overlap, and sidelap. Image file size is between 2 and 3 MB. The real-time access to satellite measurements has enhanced research on hurricane processes, prediction, and coastal impacts. Satellite images are being used to develop remote sensing tools for the study of processes related to these river inputs including sediment transport, algal blooms, and hypoxia along the coast. Katrina's impact on coastal/shelf/slope circulation and on beach morphology changes were assessed. Using higher resolution images, we have also developed techniques for detecting and quantifying hurricane-related coastal and urban flooding from Katrina. The Remote Sensing technology involves image processing, image rectification, image enhancement, and image transformations. This technology can be extensively used to determine the flooding of the areas in Mississippi and Louisiana from Hurricanes Katrina and Rita. The storm brought rain to Southeast Louisiana, breaching several levees and flooding up to 80% of New Orleans. [This study was supported in part by grants from VSU-RIG and VSU-HBCU UP, Virginia State University, Petersburg, VA 23806.]

### 104. Engineering and Science Assist in Solving the Problem of Parking

*Thaddeous Scott, Virginia State University*  
*Tineisha Downs, Virginia State University*  
*Howard Franklin, Virginia State University*  
*Alleyene Anderson, Virginia State University*  
*Salame Amr, Virginia State University*

Parking has been a problem for faculty, staff, and students at Virginia State University. It was suggested or recommended to build a multi-level, gated entry garage with activated card reader for access. The garage will be constructed to have the digital electronics circuitry to control access.

This idea would be considered for review and approval to get implemented in the near future. This project has been implemented and worked very well in other institutions. It would be highly likely to work here as well and assist in solving the problem of parking at Virginia State University.

### 105. Integration of Robotics-Based Problem Solving in an Undergraduate Introduction to an Engineering Course

*Andrew Stephenson, Savannah State University*  
*Tanisha Gordon, Savannah State University*  
*Wayne Johnson, Armstrong Atlantic State University*

Problem solving is a vital aspect of all engineering disciplines. Past approaches have used word problems and out-of-classroom projects to develop problem-solving skills. However these approaches have not necessarily appealed to the various learning styles of students nor could they actually build and test their projects. Robotics can be used as a means to introduce problem-solving skills in an introduction to engineering course. Robotics can provide students with the opportunity to learn by doing and develop and test their ideas within the classroom. The objective of this work is to develop several laboratory modules using Lego Mindstorms for use in Armstrong Atlantic State University's Introduction to Engineering course (ENGR1100). The Lego Mindstorms kit can be used to design and create programmable robots. The kit consists of a programmable micro-computer and various sensors including touch, light, and rotation sensors. It also has variable power motors that can be used for propulsion and actuation of manipulators. Use of these lab modules will enhance our students' problem-solving skills via exposure to programming algorithm formulation. It will also provide exposure to engineering design, technical writing, and teamwork. This work presents the development and results of the laboratory modules.

### 106. Silver Nanoparticle Modification of Air Filtration Media

*Obinna Umunakwe, Howard University*  
*James W. Mitchell, Howard University*

The incorporation of silver nanoparticles into air filtration media may add antimicrobial properties to air filters. The primary component of many air filters is cellulose fiber. To determine the feasibility of incorporating silver nanoparticles into cellulose fibers, a slurry containing 1% cellulose fibers and silver nitrate at a concentration of  $5 \times 10^{-4}$  M was prepared. When the pH was adjusted to about 9, silver cations ( $Ag^{1+}$ ) were reduced spontaneously to silver nanoparticles (Ago), presumably by hemiacetal groups on the cellulose fibers. Ultraviolet (UV)-Vis spectroscopy confirmed the formation of silver nanoparticles. Transmission electron microscopy seemed to show silver nanoparticles on cellulose fibers. The reaction took about 4 hours to reach equilibrium. Particle size was determined to range from 60 to 110 nm in diameter. In an attempt to increase the rate of reaction, sodium formate was added to a concentration of  $2 \times 10^{-4}$  M. The addition of sodium formate more than doubled the rate of silver nanoparticle formation. Also particles ranging from 2 to 9 nm in diameter were formed.

### 107. An Inexpensive System for Measuring and Recording Skin Temperature

*Jerome Vinson, Savannah State University*  
*Thomas Murphy, Armstrong Atlantic State University*

Medical measurement systems are often very specialized and expensive. The present project was undertaken to develop and construct an inexpensive system for measuring human skin and rectal temperatures. It is hoped that the system will be adaptable to monitoring additional sensors and taking other external body measurements such as skin moisture levels. Two systems are currently being used to conduct research in the Arm-

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strong Atlantic State University Department of Health and Physical Education. One is a relatively expensive commercial system that can monitor two sensors at a time. The second is an inexpensive system constructed in-house that supports eight sensor measurements but uses legacy software and hardware no longer supported by current personal computer operating systems. The proposed replacement system will be inexpensive (less than \$1,000), able to monitor at least four sensors from a distance of at least two feet, and easy to use. It is desirable for the system to be able to monitor up to eight sensors. The system must be able to take skin and rectal temperature measurements up to once a second within the range of 28°C to 40°C, with an accuracy of 0.1°C. It is desirable for the system to be able to support skin blood flow and sweat rate measurements in the future. The system will consist of the following: contact sensors for temperature measurement, electronics for analog to digital conversion and transmission of measurements to a computer, and computer software for measurement set up and data recording. Prototypes of each of the major system components were designed, constructed, and tested to determine feasibility of the entire system. System integration and work on improving the sensor circuit to improve measurement accuracy is currently in progress.

## 108. Use of Asynchronous Streamed Teaching Modules to Reinforce Fundamental Concepts in Engineering Courses

*Dannielle Williams, Savannah State University*  
*David W. Scott, Georgia Tech University*

Recent pressure to streamline the curriculum in engineering education has resulted in the enrollment of students in courses for which many are seemingly unprepared. There have been many explanations for the decrease in performance by the students, including a lack of student effort to understand “core” concepts, incorrect focus in fundamental classes, and a general lack of time to adequately cover the needed materials in prerequisite courses. This project was initiated to support the development of streamed asynchronous teaching modules to reinforce fundamental math, science, and engineering concepts needed by students in engineering courses, to help prevent and solve the problem of unprepared students. The goal of this effort is to provide faculty at academic institutions with tools to bolster student comprehension of these concepts so that instructors can spend less in-class time on remedial topics. The work performed under the National Science Foundation (NSF) MAGEC STEM program focused on those math concepts needed for entry-level engineering courses. Four major tasks were undertaken in this effort. First, a survey was created and circulated among targeted faculty at Savannah State University and Armstrong Atlantic State University. This survey was designed to identify math concepts that many students entering post-secondary education seem to lack. A second survey was circulated among specific faculty at Georgia Tech to identify math concepts that most often needed reinforcing for rising juniors in the engineering curriculum. Based on the survey results, reference materials were created in the form of Microsoft PowerPoint® slide presentations. The slide presentations were incorporated into interactive instruction modules using the commercial software platform Tegrity®.

## Student Poster Presentation Session 3

*Saturday, October 6, 2007 (9:45 am–11:45 am)*  
*Independence B & C*

### SOCIAL & BEHAVIORAL SCIENCES

## 109. A Description of a Primary Prevention Program on Reducing the Risk of Type II Diabetes, Metabolic Syndrome, and Cardiovascular Disease in Hispanic Families

*Felicia Ekpo, Langston University*  
*Maria Jimenez, University of North Texas Health Science Center*  
*Ximena Urrutia-Rojas, University of North Texas Health Science Center*

Obesity has become a growing problem throughout the U.S. and is also the cause of 112,000 deaths per year. Obesity is the leading cause of diabetes mellitus, metabolic syndrome, and cardiovascular disease (in which population). Obesity is most prevalent in minorities. High rates of obesity are observed in Hispanic children. The purpose of the study described is to provide an in-depth assessment, counseling, and referral of nuclear families with overweight or obese children at risk for type 2 diabetes. The study provides early detection of the risk of type 2 diabetes, coronary heart disease, and metabolic disorders; counseling on risk factors, nutrition, and physical activity; and the opportunity to participate in the preventive intervention through the Promotora Program. The intervention aims to increase physical activity, promote eating a healthier diet, and increase the chances of a healthy weight. Implementing the primary prevention program with the intervention by the Promotores will significantly reduce the risk of diabetes mellitus, metabolic syndrome, and cardiovascular disease in Hispanic families. The table of the baseline anthropomorphic, physiologic, and serum parameters of the 349 participating subjects showed increasing numbers of Acanthosis Nigricans. There were high numbers of children and parents who were obese and at high risk for diabetes mellitus, metabolic syndrome, and cardiovascular disease. Although the study is still in progress, the physicians have discovered that the Hispanic Promotores de Salud are beneficial in helping individuals maintain a healthy lifestyle.

## 110. Ethnic Group Differences in Cardiovascular Reactivity to Sexual Harassment

*Helena Green, Virginia State University*  
*Vernessa R. Clark, Virginia State University*  
*Christopher Afram, Virginia State University*

Sexual harassment is legally defined as repeated unwelcome sexual conduct that terminates or interferes with the work of the victim (Equal Employment Opportunity Guidelines, 1980). There are two main categories of sexual harassment: quid pro quo and hostile work environment (Richman et al., 1999). Quid pro quo refers to requests for sexual favors made by a person of authority to someone of lesser work/academic status in exchange for workplace benefits (Bennet-Alexander and Pincus, 1995). A hostile work environment results from unwanted and inappropriate sexual advances made from a coworker or peer to someone of the same work/academic status (Bennet-Alexander and Pincus, 1995). The effects of ethnic group affiliation on cardiovascular reactivity to sexual harassment were investigated in African-American and white college women. It was hypothesized that white participants would have greater cardiovascular reactivity to the sexual harassment stressors. It was also hypothesized that participants would show greater cardiovascular reactivity when the perpetrator is a member of the participants' own ethnic group. Cardiac

output, stroke volume, heart rate, ejection velocity index, and systolic and diastolic blood pressure were monitored as the participants viewed videotaped scenes of African-American and white women being sexually harassed by male coworkers. White women showed overall greater cardiovascular reactivity to the sexual harassment stressors than African-American participants. African-American women had no significant changes in cardiovascular reactivity to any of the scenes. Cultural norms may have influenced participants' responses to sexual harassment

### 111. The Effect of Out-the-Window Cues in Training a Level Turn on a Flight Simulator

*Leah Lloyd, Tuskegee University*  
*Marcia Rossi, Tuskegee University*  
*M. Javed Khan, Tuskegee University*  
*Mikaela Marshall, Tuskegee University*  
*Rolland Hampton, Tuskegee University*  
*Zaynah Ali, Tuskegee University*  
*Crystal Crawford, Tuskegee University*

An experiment was conducted to determine whether the use of out-of-the-window (OTW) visual cues would assist novice pilots in learning how to fly a level turn on a flight simulator. Visual cues consisted of visual hoops in the sky through which participants were expected to fly. Participants were undergraduate students enrolled in a psychology course who received extra course credit in exchange for their participation. All participants received three familiarization lessons of straight and level flight in which they were given verbal and hands-on instruction in learning to control the simulator. Participants were then given one familiarization flight in which they were given instruction on how to make a level turn. Participants in the two experimental groups received one of two different sequences of training flights in which they practiced performing a level turn. While both groups received eight training flights with three flights using the OTW cues and five not using the OTW cues, the difference between the two groups was the sequence of flights with and without visual cues. Participants in the control group received all eight training flights without visual cues. All participants were instructed to maintain certain flight parameters such as altitude and bank angle. Participants flew a final evaluation flight that required maintaining slightly more challenging parameters to determine the effectiveness of the training intervention. Deviations from prescribed parameters were calculated for each second of the flight. Results showed that the visual cues did not seem to improve performance on the evaluation flight in comparison to the control group.

### 112. Comparison of Female Mate Choice in Two Species of Spadefoot Toads

*Kristen Reynolds, Johnson C. Smith University*  
*Karin Pfennig, University of North Carolina at Chapel Hill*

Hybridization caused by mistakes in mate choice among two species of female spadefoot toads (*Spea bombifrons* and *Spea multiplicata*) is a common mechanism of reproductive character displacement that results in poorly fit offspring. Because of this, natural selection tends to favor and exaggerate the pre-mating behaviors of animals existing in sympatric populations—a process deemed reinforcement. We believed that if the costs of these mistakes were worse for one population or species than the other, then there would be an extreme difference in the way mates were chosen. We reasoned that hybridization would occur most frequently in the population and species where it was least costly. By establishing the frequency of mate choice mistakes between populations of spadefoot toads, as well as between species, it could be determined which is more likely to engage in heterospecific mating and thereby increase hybridization. We used standard phonotaxis methods to elicit responses from the toads. Our results determined that spadefoots (across both species and

population boundaries) significantly preferred calls of their own species than the heterospecific calls to which they were exposed. As a result, it was established that there was no extreme difference in mating behaviors of either species. This might be because the reactions of *S. bombifrons* (which, in previous field experiments, chose an alarming amount of heterospecific mates) may have been altered because the environment in which they were placed did not trigger the hybridization response we were looking for. Further tests need to be done to determine where and why hybridization occurs and what it means to the scientific community.

### 113. Avoidant Coping and Somatic Expression: Does Coping Style Play a Roll in Illness?

*Antoinette Sherman, Virginia State University*  
*Byron Greenberg, Virginia State University*  
*Ashley Lynch, Virginia State University*  
*La-Toya Hymes, Virginia State University*  
*Antoinette Odubiyi, Virginia State University*

As health care costs increase, finding ways to decrease illness becomes a priority. Stress has been identified as a major contributor to somatic expression, with significant consequences to health care costs and quality of life. The literature links coping skills to stress levels. This study tests the hypothesis that avoidant coping among public school teachers contributes to somatic expression. A total of 535 teachers in southern California were administered a survey to assess their level of stress and job-related burnout. Subscales used to assess these constructs included but were not limited to depression, somatic complaints, and avoidant coping strategies. Correlation analysis demonstrated that avoidant coping and somatic expression were related ( $r = .612, p < .0001$ ). Depression and somatic expression also demonstrated a significant relationship ( $r = .651, p < .0001$ ), as did avoidant and depression expression ( $r = .617, p < .0001$ ). To control for the variance due to depression, a partial correlation was performed. The remaining relationship between avoidant coping and somatic expression was clinically as well as statistically significant ( $r = .347, p < .0001$ ). Rational for this relationship are discussed, as are future studies.

## Student Oral Presentation Abstracts

### Student Oral Presentations Session 1

*Friday, October 5, 2007 (9:45 am –11:45 am)*  
*Pacific A*

#### BIOLOGICAL SCIENCES

### 114. Differential Effects of 17beta-Estradiol and Tamoxifen on Galectin-3 Expression in Human Breast Cancer MCF-7 Cells

*Bolanle Balogun, Benedict College*  
*Samir Raychoudhury, Benedict College*

Galectin-3 is a galactoside binding protein that plays a key role in a variety of biological processes including inflammation, cell proliferation, cellular differentiation, and cell–cell adhesion. In this study, we have tested the hypothesis if galectin-3 is associated with human breast carcinoma MCF-7 cells. If yes, then how is it regulated by estrogen and tamoxifen? Estrogens are hormones that function as signaling molecules and act on target tissues by binding to estrogen receptors (ERs). Tamoxifen can act as a weak estrogen agonist or act as an estrogen antagonist and blocks

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ER-mediated breast cancer cell proliferation. We have analyzed galectin-3 protein expression in MCF-7 cells after treatment with  $E_2$   $10^{-6}$ M,  $E_2$   $10^{-8}$ M, TAM  $10^{-6}$ M, and TAM  $10^{-8}$ M for 24, 48, and 72 hours and compared it to 0.1% bovine serum albumin and 0.1% dimethyl sulfoxide containing media as control groups. Protein from cell extracts was repaired with a detergent buffer and a cocktail of protease inhibitors, and protein content was determined by bovine corneal endothelial assay. Proteins were separated by SDS-PAGE, and immunodetection of proteins was carried out by Western blot analysis using rabbit polyclonal galectin-3 primary antibody followed by incubation with horseradish peroxidase-conjugated secondary antibody. After chemiluminescence detection and visualization on X-ray film, we performed scanning and densitometric analysis. There was no relative change in galectin-3 localization in the 24-hour treatment group. However, both 48- and 72-hour treatment with tamoxifen  $10^{-6}$ M significantly decreased relative expression of galectin-3 in MCF-7 cells. The downregulation of galectin-3 by tamoxifen was associated with growth suppression in MCF-7 cells. The results suggest that galectin-3 expression is necessary for the maintenance of the transformed and tumorigenic phenotype of MCF-7 breast carcinoma cells. Thus, the present study demonstrates the blockage of galectin-3 expression by tamoxifen at relatively higher concentrations and establishes a role that galectin-3 may serve as a molecular target for therapy. [This work was supported by grants from the National Institutes of Health (NIH P20 MD00233 and HD38342) and an INBRE Award P20 RR16461 (EPSCoR/CRP).]

## 115. The Role of Human Endogenous Retrovirus (HERV-W) in the Occurrence of Habitual Spontaneous Abortion

*Cindi Lewis, Claflin University*

*Omar Bagasra, Claflin University*

*Ioana Rotar, Claflin University*

*Ariana Stir, Claflin University*

*Joseph Pastener, University of Health Systems*

It is estimated that approximately 15% of all pregnancies terminate as a result of spontaneous abortion. Many of these spontaneous abortions occur early in pregnancy (within two or three weeks after fertilization), so that woman spontaneously abort without realizing that she is pregnant. Although most would attribute these to chromosomal abnormalities or physiological defects (in 90% of cases, no such abnormalities are found), we propose that the cause can be attributed to the absence of a human endogenous retrovirus (HERV-W) at the cellular level. HERV-W contains an immunosuppressive region that has the potential to protect the genetically different fetus from attack from the mother's immune system, thus preventing rejection or spontaneous abortion. A double-blind study using placental tissue from 28 patients was conducted in which in situ PCR was carried out on the samples with primers designed from the known sequence of HERV-W, followed by hybridization with a fluorescent probe that binds to the amplified copies of the virus. The fluorescence shows the presence of HERV-W at the syncytiotrophoblasts, the fetal layer of cells that can be attached by the maternal immune system. Quantification of viral fluorescence of positive slides can also be conducted to validate results, since this is less subjective than simply observing fluorescence. Further experimentation can yield possible treatment for women who suffer from habitual spontaneous abortion.

## 116. Role of Alpha-Smooth Muscle Actin in Myoepithelial Cell Function

*Kariel Ross, Langston University*

*C.J. Haaksm, University of Oklahoma Health Sciences Center*

*J.J. Tomasek, University of Oklahoma Health Sciences Center*

Myoepithelial cells are proposed to generate the contractile force responsible for lactation in mammary glands. Myoepithelial cells are character-

ized by alpha-smooth muscle actin (ASMA). The objective of this study was to investigate whether ASMA is indispensable in the contraction of myoepithelial cells in mammary glands. Myoepithelial cell contraction in mammary glands in ASMA-null and ASMA-WT mice was analyzed. Pups were taken away from the mothers 6 hours before the beginning of the in vivo and in vitro experiments. In the in vitro experiment, mammary tissue was obtained, placed in various concentrations of oxytocin, and fixed and examined using rhodamine phalloidin staining. For the in vivo experiment, the mothers were injected with oxytocin and, after 15 min, mammary tissue was fixed and examined. Preliminary results show that in the in vitro assay myoepithelial cells from ASMA-WT and ASMA-null mice contract similarly. In contrast, the results of the in vivo assay show that the contraction of ASMA-WT myoepithelial cells is greater than ASMA-null myoepithelial cells. These results support the hypothesis that myoepithelial cell function is altered in ASMA-null mice. [The work was supported by National Institutes of Health grant R01 GM60651.]

## 117. Cancer Therapies and Prevention

*Jasma Shelby, Jackson State University*

*Carolyn B. Howard, Jackson State University*

*Ernest B. Izevbigie, Jackson State University*

Cytochrome P450 (CYP) heme proteins metabolize many anticancer drugs and aid in the body's defense against cancer. However, CYP modulation has also been implicated in cancer initiation. Also, CYP3A4 serves as an indicator of drug-drug interactions. Phase 2 enzymes, on the other hand, provide protection against cancer by clearing metabolic products from the body. It is therefore relevant in drug validation studies, to examine the effects of various exposures on CYPs as well as phase 2 enzymes. A model anti-cancer agent is one that does not significantly affect CYP expression, but induces increased expression of phase 2 enzymes. *Vernonia amygdalina* (V.A.) extract has been shown to inhibit cancer cell growth, whereas low doses of ethanol have been shown to be stimulatory. Also, we have shown that V.A. treatment reverses the stimulatory effects of alcohol, a novel mode of action of V.A. We presently report in vivo experiments using mouse liver microsomes, analyzed by Western blotting and RT-PCR, which further validate the chemotherapeutic action of V.A. and confirm our laboratory's in vitro data.

## Student Oral Presentations Session 2

*Friday, October 5, 2007 (9:45 am -11:45 am)*  
*Pacifica B*

## CHEMISTRY & CHEMICAL SCIENCES

### 118. Synthesis of Poly-Isopropylacryamide Microgels

*Brittany Blunt, Albany State University*

*Seong Seo, Albany State University*

Scientists have given significant interest to the field of nanoscience in the last decade. Researchers have tried to understand and define the different properties of polymeric nanomaterials. Polymer microgels, however, have new properties that cannot be obtained from regular polymer solutions and are the central focus of this research. Responsive microgels respond by changes in swelling due to changes in the environment such as temperature and pH. Poly-isopropylacryamide is a type of responsive microgel that is widely used. We studied the characteristics of poly-isopropylacryamide microgels, such as the decrease in particle size around the LCST with a series of different temperatures. First, the microgels were synthesized using free-radical precipitation polymerization. These microgels were then observed under a microscope. Next, we used photon cor-

relation spectroscopy, also known as a particle size analyzer, to determine the particle size. The particle sizes ranged from around 1,260 to 503 nm in the experiment. From this, we observed how the microgels respond to variations in temperature. We concluded that poly-isopropylacrylamide microgels can further be used in various applications including drug delivery systems and biotechnology.

### 119. Effects of Different Doses of Vitamin C on the Psychomotor Functions of Aged Mice

Karole Blythe, Langston University

Michael Forster, University of North Texas Health Science Center

Nathalie Sumien, University of North Texas Health Science Center

The purpose of the study was to find which dose of vitamin C was most effective in reversing age-related declines in psychomotor functions in C57BL/6 mice and in decreasing oxidative damage in the cerebellum. At 21 months of age, the mice were assigned to one of the following treatment groups: vehicle (water), or 100, 400, or 600 mg/kg/day of vitamin C. A group of 3-month-old mice was used as a young control group receiving the vehicle. The mice were gavaged for two weeks before the start of behavior testing. The behavior tests measuring psychomotor functions lasted for 3 weeks, after which the mice were euthanized, brain regions were dissected, and lipid and protein oxidation analyses were performed on the cerebellum. There was no significant effect on weekly weight and food consumption by any dose of vitamin C. Overall higher doses of vitamin C seemed to have a deleterious effect on psychomotor functions, as observed on the wire suspension and bridge tests. Furthermore, lipid peroxidation levels were increased in the cerebellum of the mice receiving the highest doses. Some of the trends in the data did show treatment effect; however, small experimental groups and large variances prevents most significant differences from being observed.

### 120. Black Locust (*Robinia pseudoacacia*) and Mimosa (*Albizzia julibrissin*) as Agro Forestry Feed

Calvin Hawkins, Langston University

J. Carrier, University of Arkansas

E. Clausen, University of Arkansas

The goal of our experiment was to analyze the Black Locust tree (*Robinia pseudoacacia*) and the Mimosa tree (*Albizzia julibrissin*) for the potentially toxic agents robinin and mimosine, respectively. Because of the potential toxicity, the Black Locust tree has not been widely used. These trees are known to grow in some of the contiguous United States and in some European and Asian countries; these trees can be used as ornamental trees, shade trees, and fence posts. Samples were taken from ARS USDA Booneville, AR, harvested in July, August, and September of 2005. Each sample was extracted and analyzed by high-performance liquid chromatography with an ultraviolet (UV) detector. The standard tested for robinin had a retention time of 21.432 min and had UV absorptions of 265.8 and 346.5 nm. Standards with the concentration of 1.00, 0.10, and 0.01 mg/ml were used to develop a calibration curve to examine robinin concentrations observed in each sample of black locust. The equation  $y = 9.754E + 06x + 4462.5$  was developed from the data gathered. Each sample of black locust was tested against this standard and no robinin was observed. A standard for mimosine was tested and had the retention of 3.255 min and had UV absorptions of 216.4 and 281.2 nm. Each sample of the mimosa tree was tested. No mimosine was detected. Robinin was not detected; therefore, the toxicity of black locust is not a result of robinin. Further research on other aspects of the tree is necessary to verify this assumption.

### 121. Speciation Diagrams of Cr(III) and Cu(II) with Glutamic Acid: Novel Hydrolytic Species of These Systems

Herman Holeifield, LeMoyne-Owen College

Yahia Hamada, LeMoyne-Owen College

Speciation diagrams and stability constants for glutamic acid (Glu) with the chromium metal ion ( $Cr^{3+}$ ) and the copper metal ion ( $Cu^{2+}$ ) in aqueous solutions are presented: 25°C, I = 0.1 M. Novel hydrolytic species for both metal ions are determined. For the  $Cu^{2+}$ :Glu system, the most successful model that refined the potentiometric data contains the simple one-to-one complex, the bis-complex, and the mono-hydroxo complex. The overall stability constants for  $Cu^{2+}$ :Glu complexes have the respective values of  $\log \beta_{110} = 7.64 \pm 0.19$ ,  $\log \beta_{11-1} = 1.32 \pm 0.73$ , and  $\log \beta_{120} = 13.63 \pm 0.23$ . For the  $Cr^{3+}$ :Glu system, the overall stability constants for the complexes formed have the respective values of  $\log \beta_{110} = 8.34 \pm 0.03$ ,  $\log \beta_{11-1} = 1.92 \pm 0.14$ , and  $\log \beta_{11-2} = -4.63 \pm 0.13$ . These results for the  $Cr^{3+}$  system cover a wider pH range and are more accurate than those reported previously. The NMR experiments for Glu revealed down-field shifts of all protons as pH values decrease from 11.21 to 2.85.

### 122. Monitoring the Formation of Inclusion Bodies During Overexpression of Interleukin 1 $\alpha$ in *Escherichia coli*

Charles Loftis, Langston University

Dakshinamurthy Rajalingam, University of Arkansas

Walter Merriman, University of Arkansas

Thallapuram Krishnaswamy, University of Arkansas

Suresh Kumar, University of Arkansas

This study is aimed at understanding the overexpression of interleukin-1 $\alpha$  (IL-1 $\alpha$ ), a cytokine, in *Escherichia coli*. IL-1 $\alpha$  is overexpressed as inclusion bodies in *E. coli*. Alteration of the conditions of bacterial growth is found to share little effect on the overexpression of IL-1 $\alpha$ . The inclusion bodies of IL-1 $\alpha$  accumulate maximally 9 hours after initiation of bacterial growth. Mass spectroscopy data suggest that formation of inclusion bodies of IL-1 $\alpha$  proceeds via coalescence of misfolded monomeric intermediate states. A novel Congo red-based staining method has been developed to specifically detect the formation of inclusion bodies in bacterial cells.

## Student Oral Presentations Session 3

Friday, October 5, 2007 (9:45 am –11:45 am)  
Independence D

## COMPUTER SCIENCES AND MANAGEMENT INFORMATION SYSTEMS

### 123. Managing Disasters Instead of Them Managing You

Reashell Lee, Southern University at New Orleans

The electronic well-being of any institution is integral to its sustenance and success. Any event that endangers this delicate welfare threatens the longevity of the establishment as a whole. For Southern University at New Orleans (SUNO) and other regional universities and colleges, Hurricane Katrina proved to be such an event. In the wake of the storm, SUNO lost all access to telephone and cell phone communication, computers, and data. Students, faculty, and staff were scattered across the nation without knowing if the campus was safe or imperiled. At the time when the need for reliable information was greatest, the vulnerability of the university and city was devastatingly evident. With Katrina a not so distant memory, SUNO is faced with new challenges. Perhaps even greater than rebuilding is the need for a tested and time-efficient recovery plan for the next

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disaster, whether natural or manmade. SUNO has taken an aggressive approach to protect its electronic welfare. Existing university websites were enhanced and updated with links to guide students, faculty, and staff in case of future disasters. Elaborate data backup systems are also used to ensure security and maintenance of vital data. In addition to SUNO's on-line Blackboard based in Colorado, remote data backup and recovery systems are used to store and update data daily. Finally, SUNO's mainframe is also hosted off campus at Loyola University at New Orleans. The purpose of this paper is to investigate the competence and capability of SUNO's disaster recovery efforts.

## 124. Use of Topology Rules for Repair of Zoning Data Set in Somerset County, Maryland

*Dana McNair, University of Maryland Eastern Shore*  
*Tracie Earl, University of Maryland Eastern Shore*  
*Arthur L. Allen, University of Maryland Eastern Shore*

The Maryland Somerset County Department of Planning and Zoning had produced a zoning data set that needed updating and correcting. This was a very large and complicated data set that had become damaged through continuous use. To complete this project, a mathematical science called topology was needed. This project required the ArcINFO version of ArcGIS, and since the County only had the ArcView version, the data set had to be manipulated in the University of Maryland Eastern Shore GIS (geographic information system) lab. The data set was converted into the geodatabase format to allow the use of topology tools and functions. Once the topology rules were applied, visualizations of errors were attained. ArcGIS identified approximately 2,000 "overlaps" and 500 "gaps" in the data set. Even though these errors were corrected individually, the use of topology functions allowed for correction of the data set that was much less time-consuming than recreating the data set from inception. This project provided the student with a greater level of understanding of how geospatial tools and application are used in research. Further, the student was able to better understand that higher levels of geo-science software afford greater flexibility for the manipulation of various data sets.

## 125. Teaching Programming for Non-Programming Individuals

*Anthony Morris, Talladega College*  
*Syed Raza, Talladega College*  
*Mark J. Jones, Talladega College*

Virtual reality (VR) has always sparked many people's imagination. Writing VR programs to explore and develop the mechanisms by which humans can more effectively and enjoyably interact with technology is not an essay job. There have been relatively few innovations in the teaching and learning of programming in the last 30 years, despite the fact that introductory programming courses are often extremely frustrating to students. This research is focused on creating a programming environment based on Alice that will give a graphical introduction of programming language features such as Flow Control and Boolean Logic through the activity of creating short animated movies. The approach was model possible recently, due to the increased power of desktop computers and the development of novel software that uses that power, especially for 3D graphics. Originally developed by Carnegie Mellon's University, as part of a research project in Virtual Reality, Alice lets you be the director of a movie, or the creator of a video game, where 3D objects in an onscreen virtual world move around according to the directions you give them. The goal of this innovative approach is to allow traditional programming concepts to be more easily taught and more readily understood.

## 126. Role of Technology in Relieving the Tax Burden of America's Middle Class

*A. Deanna Reine, Southern University at New Orleans*  
*Annan Omar, Southern University*

Development of technology will be of paramount importance to fund both federal and state government's treasuries with enormous amounts of tax dollars that annually go uncollected. This is money that could benefit state and federal government resources. Offshore accounts, the World Wide Web, and encryption programs have made it easy for tax evaders to avoid paying taxes. This paper will illustrate the need for research and development of tools that dissuade and make it impossible to evade taxes.

## Student Oral Presentations Session 4

*Friday, October 5, 2007 (9:45 am -11:45 am)*  
*Independence E*

### PHYSICAL & MATHEMATICAL SCIENCES

## 127. Framing Dynamic Modeling for Type 2 Diabetes

*Angelitta Britt, Norfolk State University*  
*Derrick Rollins, Iowa State University*

Diabetes is a chronic disease in which the body does not produce and/or properly use insulin. As a result, it may cause severe complications and/or physical impairments that can lead to amputations and often death. Although there are various forms of diabetes, the most complex is type 2. In this type of diabetes, the body does not produce enough insulin and/or does not use insulin properly. Type 2 diabetes (TTD) accounts for nearly 95% of all cases with significant morbidity and mortality. This is often because physicians lack the adequate knowledge to treat TTD and usually base treatment on a general understanding rather than an individual basis. TTD is very complex and can vary greatly from person to person depending on the vastly different ways that insulin and glucose are produced, consumed, and internally controlled. The principle of this research is to begin modeling and/or predicting glucose levels in TTD subjects under free-living conditions using noninvasive variables such as diet, activity level, and blood pressure. The methodology in this project consists of collecting and analyzing data from TTD subjects using the Mini-Med Solutions glucose monitor and software packet to measure glucose levels over a period of three to five days. To measure and quantify activity level, the Body Media Activity Monitor Watch and software packet will be used. Diet will be recorded and analyzed into several different categories such as carbohydrates, fat, and protein. The mathematical model will be based on a block-orientated system using various forms of calculus and differential equations. The long-term goal of this research is to develop an efficient, inexpensive method of improving glucose control in TTD patients that is uniquely tailored to the individual patient. The outcomes will provide optimal glucose control for TTD patients, thus preventing and/or reducing the effects of complications.

## 128. Our Journey with Triangular Numbers

*Stacy Cobb, Savannah State University*  
*Natasha Patterson, Savannah State University*

Mathematicians and non-mathematicians have been fascinated for centuries by the properties and patterns of numbers such as triangular numbers. The numbers that can be arranged in a compact triangular pattern are called triangular numbers. The triangular numbers are formed by a partial sum of the series  $1 + 2 + 3 + 4 + 5 + 6 + 7 \dots + n$ . Therefore,

$$T_1 = 1$$



$$T_2 = 1 + 2 = 3$$

$$T_3 = 1 + 2 + 3 = 6$$

$$T_4 = 1 + 2 + 3 + 4 = 10$$

Hence, the  $n$ th triangular number can be obtained as  $T_n = n*(n + 1)/2$ , where  $n$  is any natural number. In other words, triangular numbers form the series 1, 3, 6, 10, 15, 21, 28.... In this paper, we investigate some important properties of triangular numbers. Some important theorems on the mathematical concept of triangular numbers will be proved.

### 129. Convergence of the Accelerated Overrelaxation (AOR) Method Under a Modified Sassenfeld Condition

*Nathan Faulkner, Winston-Salem State University*

*John O. Adeyeye, Winston-Salem State University*

We establish a general result concerning the convergence of the accelerated overrelaxation (AOR) method under a modified Sassenfeld condition. The result extends the known theorem that convergence holds under diagonal dominance conditions. It is also an extension of the result that convergence of Gauss-Seidel method occurs under the Sassenfeld conditions. Thus, our work extends results in two useful directions. A numerical example showing the usefulness of this result is also given.

### 130. Using a Spreadsheet to Verify the Rule of 72

*Keshia Hutton, Southern University at New Orleans*

*Joe Omojola, Southern University at New Orleans*

In different investment strategies, one is interested in how fast the investment can grow. In particular, the investor is interested in how soon her investment could double because this gives an indication of how fast the investor could reach her goal. One measure of doubling time is "The Rule of 72." This rule states that the time required for an investment amount  $A$  to double to  $2A$  is 72 divided by the interest rate of the investment. For example, if the annual yield for an investment is 9%, the rule of 72 states that it will take 8 years (72 / 9) for the invested amount to double. In this research, we use a spreadsheet (Microsoft Excel) to verify "The Rule of 72" for different investment vehicles such as certificate of deposit (CD), mutual funds, stock market, savings, money market, and bonds. These methods of investment were chosen because they are the most common for the average investor. Our results indicate that "The Rule of 72" works. In this project, the impact of investment fees and management fees are not taken into consideration. Additionally, extraneous conditions such as the stock market collapse and depression are not factored into our calculations. Our calculation is also based on a one-time investment of \$ 1,000 for the lifetime of the investment. Additional deposits are not considered. The interest in this calculation is also reinvested over the lifetime of the investment. Consequently, the limitation of taxes paid on the investment is eliminated. Finally, the interest is calculated once every year instead of on a more frequent basis such as monthly, annually, or even continuously. Future work includes using "The Rule of 72" to determine the amount of time required for an investor to reach a predetermined objective or goal.

### 131. Electron Lithography to Create an Aperture to Characterize Single Quantum Dot to Develop Materials to Be Used in Infrared Detectors and Optical Communication

*Benjamin Newton, University of Arkansas at Pine Bluff*

*Mansour Mortazavi, University of Arkansas at Pine Bluff*

*G. Salamo, University of Arkansas*

*Morgan Ware, University of Arkansas*

Characterizing quantum dots and wells will catapult us past first-generation quantum devices. The isolation of a single quantum dot by means of electron lithography is the first step in this process. It has been found that

electron beam lithography may be used to create submicron-sized patterns on the surface of semiconductor material. This in turn suggests that this technique may be used to create an aperture over a semiconductor surface filled with quantum dots and wells. In our research, once the quantum dot or well has been isolated, we will use a spectrometer to perform photoluminescence measurement on singular quantum dots or wells to ascertain more of their properties to be used in future second-generation quantum devices such as infrared detectors and optical communications.

## Student Oral Presentations Session 5

*Friday, October 5, 2007 (9:45 am – 11:45 am)*

*Wilson Room*

### TECHNOLOGY & ENGINEERING

#### 132. Monitoring Toxic Gases Using Wireless Sensor Networks

*Levaughn Denton, Virginia State University*

*Yoon Kim, Virginia State University*

Wireless sensor networks (WSNs) are a viable solution to the ventilation and possible gas attack issues that plague the New York City subway system. The implementation of WSNs in the subway system will create a smart environment that is able to retrieve sensory data, monitor the data received, and control the environment variables sensed. This will be accomplished using a WSN, which is a computer network system that consists of wireless sensors that monitor, track, or control different variables within the environment. The conventional method of monitoring a gas includes a human physically measuring gas concentrations using a hand-held sensor. The proposed method includes autonomous WSN nodes that intelligently monitor its surroundings. Therefore, a basic service set (BSS) architecture is created. This architecture is comprised of software that receives data obtained by WSN nodes, and if necessary, sends a signal to a basic fan that extracts contaminated air out of a particular location or environment. Using WSNs allows several gases to be autonomously monitored. This study focuses on carbon monoxide (CO), which becomes toxic to the human body when its gas concentrations exceed 35 ppm. A comprehensive agent-based modeling simulation and analysis of a toxic CO environment will be researched over the next several months, culminating in spring 2008. In 2005, the New York City subway system had 1.5 billion passengers. These passengers could have been exposed to odorless, potentially toxic gases such as CO. However, the ominous shortfalls of the subway system in the areas of ventilation and gas threat security can be remedied using WSNs, since they will help prevent potentially severe situations by centralizing data acquisition of environmental variables and managing proper ventilation.

#### 133. Construction of a Demonstration Fiber Optic Voice Communication System

*Jabari Green, Savannah State University*

*Benjamin Klein, Georgia Tech University*

Fiber optic communication systems are widely used for long-distance links. For example, many international telephone connections are carried by fiber optic lines. In this project, we have constructed a simple fiber optic-based voice communication system. The system consists of a microphone and amplifier, a light-emitting diode (LED) and LED modulation circuit, an optical fiber, a silicon photodetector and photodetector circuit, and an amplifier and speaker to reproduce the sound. The system was successfully demonstrated by the student. This project introduced many important electrical engineering tools, including electrical circuitry, opti-

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cal components, and audio components, as well as system design and testing concepts.

## 134. Gaussian Elimination Method for Solving Fin Heat Conduction Problems

*Semhar Kassahun, Virginia State University*  
*Nassen Ghariban, Virginia State University*

In this paper, a numerical model is formulated for solving the heat conduction problem in fins. The approach and formulation of the present scheme are general for fins with arbitrary contours or boundary conditions. Details of developing the nodal equations and writing them in matrix format to form a linear system are presented. The general Gaussian elimination method is used to form the augmented matrix, forward sweep to convert the problem to upper triangular form, and the backward sweep to solve this upper triangular system to provide temperature at any location. Matlab is used as a single platform for computation and visualization of the results. Selected results of the implementation are presented for fins with irregular geometries.

## 135. Simulation of the Tennis Player's Arm Swing Motion

*Onaje Lewis, Savannah State University*  
*Hyoungyun Oh, Savannah State University*

The modeling of the human factor and the analysis of the human movement have been a critical tool to search for the optimized motion in a variety of areas. This research focuses on two aspects: 1) the modeling of human arm structure and movement and 2) computational simulation of the tennis player's full swing motion while he receives a ball. For the objective, the arm structure is regarded as a serial mechanical manipulator with three rigid links at shoulder, elbow, and wrist. Each link is connected frictionless and with two hinged revolute joints so that our mechanism is of six degrees of freedom. For the experimental objective, the discrete motion data, which is obtained through the observation of a related video file, is applied to the DH convention to obtain each component's sequential position vectors. A continuous kinematical operating procedure then is achieved based on the best approximation theory using a polynomial of 10 degrees. These make it possible to produce each component's velocity and acceleration data for further dynamics analysis. Then the graphical simulations for each component, which are made in MATLAB, present the swing motion in a clearer way. Finally, the current contribution of this research and directions of future research are introduced.

## Student Oral Presentations Session 6

*Friday, October 5, 2007 (3:30 pm -5:30 pm)*  
*Pacifica A*

### BIOLOGICAL SCIENCES

## 136. Intermittent Hypoxia Conditioning Protects Against Oxidative Damage to Brain Mitochondria in Ethanol Withdrawn Rats

*Brittanie Atkinson, Langston University*  
*J.W. Simpkins, University of North Texas Health Science Center at Fort Worth*  
*R. Mallet, University of North Texas Health Science Center at Fort Worth*  
*F. Downey, University of North Texas Health Science Center at Fort Worth*  
*A. Wilson, University of North Texas Health Science Center at Fort Worth*  
*M.E. Jung, University of North Texas Health Science Center at Fort Worth*

We hypothesized that intermittent hypoxia conditioning (IHC) protects against toxic effects of ethanol withdrawal (EW) on brain mitochondria. This hypothesis is based on previous findings that IHC protects against cardiovascular disorder and EW perturbs mitochondria. Young adult ovariectomized rats with or without 17 $\beta$ -estradiol replacement received a 5-week control dextrin or ethanol diet (6.5%). Twenty days before the end of the diet, rats received IHC 10-minute hypoxia (9–10% O<sub>2</sub>) followed by a 4-minute normoxia, repeating five times a day until sacrificed. Twenty-four hours after termination of the ethanol diet, rats were tested for physical signs of EW and immediately sacrificed. Mitochondria from the cerebella were processed to assess the levels of carbonyls and malondialdehyde as indicators of protein oxidation and lipid peroxidation, respectively. Functional damage to mitochondria was assessed by measuring the activity of the enzyme cytochrome C oxidase and mitochondrial permeability transition pore, of which excess pore opening dysregulates the passage of specific molecules across the mitochondrial membrane. While EW rats without IHC showed severe EW signs, rats with IHC showed no EW signs. Compared to EW rats without IHC, EW rats with IHC showed significantly lower levels of protein carbonyls, and of malondialdehyde, a higher activity of cytochrome C oxidase, and less mitochondrial permeability transition pore opening. 17 $\beta$ -Estradiol replacement increased the effects of IHC on these parameters. These results suggest that IHC counteracts against EW-induced oxidative and functional damage to brain mitochondria of female rats in a manner that is more effective in the presence of estrogen.

## 137. Potassium Dichromate-Induced Oxidative Stress, Genotoxicity, and Cytotoxicity in Human Liver Carcinoma (HepG2) Cells

*Constance Barnes, Jackson State University*  
*Anita K. Patlolla, Jackson State University*

Chromium is a widespread industrial waste. The soluble hexavalent chromium Cr (VI) is an environmental contaminant widely recognized to act as a carcinogen, mutagen, and teratogen toward humans and animals. The fate of chromium in the environment is dependent on its oxidation state. The reduction of Cr (VI) to Cr (III) results in the formation of reactive intermediates together with the oxidative tissue damage and a cascade of cellular events. However, the mechanisms of the toxic action of chromium are not completely understood. The main purpose of this study was to evaluate the occurrence of oxidative stress, genotoxicity, and cytotoxic-

ity in the human liver [HepG2] cells exposed to potassium dichromate. HepG2 cells were cultured following standard protocol and exposed to various concentrations [0–50  $\mu\text{M}$ ] of potassium dichromate [ $\text{K}_2\text{Cr}_2\text{O}_7$ ]. After exposure to the toxic metal, we performed the MTT assay to assess the cytotoxicity, thiobarbituric acid test to evaluate the degree of lipid peroxidation as an indicator of oxidative stress, and DNA damage evaluation using alkaline comet assay. Study results indicated that potassium dichromate is cytotoxic to HepG2 cells, showing LD<sub>50</sub> values of  $8.83 \pm 0.89 \mu\text{g/ml}$  and  $6.76 \pm 0.99 \mu\text{g/ml}$  for cell mortality upon 24 and 48 hours of exposure, respectively, indicating a dose- and time-dependent response with regard to cytotoxic effect of potassium dichromate. A statistically significant increase in the concentration of malondialdehyde [MDA], an indicator of lipid peroxidation, was recorded in exposed cells [ $15.9\text{--}69.9 \mu\text{M}$ ] compared to control [ $13 \mu\text{M}$ ]. Similarly, a strong dose-response relationship ( $p < 0.05$ ) was also obtained with respect to potassium dichromate-induced DNA fragmentation [comet assay] in HepG2 cells exposed [ $3.16 \pm 0.70\text{--}24.84 \pm 1.86$  microns] to potassium dichromate than control [ $3.07 \pm 0.26$ ]. Our results demonstrate that potassium dichromate is highly cytotoxic to HepG2 cells, and its cytotoxicity seems to be mediated by oxidative stress and DNA damage.

### 138. A Study of the Concentration of Airborne Microbes in Selected Communities Affected by Hurricane Katrina

Brandon Carter, Dillard University

J. Bernard Singleton, Dillard University

The environment in New Orleans post-Katrina is a concern. Nearly the entire city was under as much as 10 feet of water for weeks. Broken sections in the sewer lines contaminated the waters. Mold is growing everywhere in all of the once-flooded buildings. Dead bodies were present. It is hypothesized that there are higher concentrations of airborne microbes in inside areas versus outside areas that can potentially pose a risk to the residents of New Orleans that are returning to the city. Infectious cases have already been reported that were associated with Katrina-affected areas. Sampling and testing the air may show that the concentrations of bacteria and fungi are present, therefore being able to determine what communities have unsafe levels of airborne microbes. Liquid impinger apparatuses were used to collect samples in several different communities with different levels of destruction in the Greater New Orleans area. The impingers were filled with 20 mL of sterile water and attached to a vacuum pump that ran for 90 minutes. A serial dilution method was used. The diluted samples were plated on enriched agar plates (R2A media) and incubated 24–48 hours at 37°C. The colonies were then enumerated. The data indicated that the concentrations are higher inside the buildings than they are outside. Also, the data collected showed that areas that had the most floodwaters had the highest concentration of contaminants. The short- and long-term effects on the health of individuals working in and returning to the areas are of a concern. There is a need to continue to monitor the concentration of microbes present as well as the relevant cases that may develop even after remediation. Also, there is a need to determine what specific airborne pathogens are present as well as their significance. In the near future, there are plans to perform DNA analyses of the microbes cultured through collaboration with the University of Colorado at Boulder's Department of Civil, Environmental, and Architectural Engineering.

### 139. Rabecular Meshwork Cells: A Model System to Evaluate Glucocorticoid-Induced Phagocytosis and Calcium Signaling

Cherie Ognibene, Langston University

Xinu Zhang, University of North Texas Health Science Center

Thomas Yorio, University of North Texas Health Science Center

Millions of people have been diagnosed with glaucoma. Glucocorticoids exacerbate the effects of open-angle glaucoma by increasing the intraocular pressure. Glucocorticoids alter the ability of trabecular meshwork (TM) cells to phagocytose extracellular material and thus can increase the intraocular pressure. Dexamethasone (DEX) is a type of glucocorticoid that has been shown to inhibit the ability of trabecular meshwork cells to phagocytose. Our hypothesis is that cultured cells from glaucoma patients and from patients without glaucoma treated with DEX would ingest less beads than untreated cells. Four assays were conducted on two lines of cells: NTM174-04 (non-glaucomous) and GTM520-05 (glaucomous). Beads were used to track the abilities of the cells to phagocytose. Cells were treated with DEX (100 nM) and then incubated with beads coated with rabbit IgG. Next, cells were fixed and incubated with goat anti-rabbit IgG 633 dye to differentiate intracellular from extracellular beads. DAPI (6'-4-Diamidino-2-Phenylindole) was used to calculate how many beads per 100 cells were phagocytosed. The data collected showed that when GTM520-05 cells were treated with DEX, they ingested fewer beads. GTM520-05 cells were more sensitive to the DEX treatment than NTM174-04 cells. Another study was to determine the effect of endothelin-1 (ET-1) on calcium homeostasis in TM cells. BQ610 and BQ788, two ET-1 receptor antagonists, were used to block ET-A and ET-B, respectively. ET-1-induced calcium influx in TM cells is mediated mostly by ET-A compared to ET-B, since BQ610 was able to completely block ET-1 effects. [This abstract was supported by National Institutes of Health grant number 2T35HL007786-13.]

## Student Oral Presentations Session 7

Friday, October 5, 2007 (3:30 pm -5:30 pm)

Pacifica B

## CHEMISTRY & CHEMICAL SCIENCES

### 140. Toward a More Active and More Stable Ruthenium Catalyst for Tetra-Substituted Olefin Formation Via the Ring Closing Metathesis Method

Weslee Glenn, Hampton University

Robert H. Grubbs, The California Institute of Technology

Katie Campbell, The California Institute of Technology

It was the summer goal to synthesize two ruthenium complexes that can catalyze tetra-substituted olefin formation via ring closing metathesis quickly and without decomposing, in short, making the catalysts active and stable. First, to tackle the issue involving activity, phenyl substituents will be used on the nitrogen atoms instead of the more bulky mesityl substituents found on the second-generation Grubbs catalyst. Geometrically, this should create a bigger open pocket for more sterically hindered substrates to approach the ruthenium center of the catalyst. Second, C-H activation is a known decomposition pathway of ruthenium complexes. As such, a way to thwart that route to decomposition is to restrict rotation about the N-aryl bond. In effect, the addition of bulk to the backbone of the carbene ligand was used. In addition, precedent literature suggested a stability issue arose on an analog to the second-generation Grubbs catalyst that engaged inductively electron donating alkyl groups on the backbone of the ligand. Thus, it stands to reason that substituents added to the backbone of these carbene ligands must remain bulky but be elec-

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tron withdrawing instead. With that knowledge, inspiration for summer work was proposed.

## 141. Microwave-Assisted Synthesis of a Novel Smallpox Biosensor

*Krystal Hart, Morgan State University*  
*Angela Winstead, Morgan State University*

There is a need to decrease the risk of false-positives in some biological sensing applications. To develop a near-infrared (NIR) cyanine dye that fluoresces at longer wavelengths than Cy-5 is the proposed answer to this arduous question. NIR cyanine dyes are used in a variety of biological applications. One of particular interest is Cy-5, which has been used as a fluorescence labeling probe for smallpox biosensors. Cy-5 exhibits emission spectra in the NIR region of 670 and 710 nm. However, interference of biological agents, such as heme and biological porphyrins fluoresce within this region. The purpose of this research is to develop and synthesize an NIR smallpox biosensor that minimizes the interference of biological agents, that is, biosensors that fluoresce at longer wavelengths than Cy-5. Our approach uses microwave-assisted organic synthesis to facilitate the synthesis. The synthesis of the dye requires two precursors: the heterocyclic salt and commercially available bisimine. Previous studies conducted in our lab include the development of heterocyclic salt derivatives used for the synthesis of NIR-ethyl dye (the preliminary model dye). The present objective is to synthesize indolenium sulfonate, the starting reagent exhibiting the once-absent sulfonate group, and then proceed in the manipulation of the heterocyclic salt derivatives. The use of microwave techniques has made it possible to synthesize the heterocyclic salt derivatives, which contain a sulfonate group at time-efficient rates. Thus far, the synthesis of indolenium sulfonate ethyl salt, hexanoic acid salt, methyl salt, and OH salt use the Biotage Microwave system, showing comparable product yields of 84, 64, 77, and 67%, respectively. The results were analyzed using nuclear magnetic resonance interpretation techniques and concluded that the cyanine dye salt precursors can be successfully synthesized using microwave chemistry. Microwave-assisted synthesis of more complex cyanine dye derivatives and their active NHS esters using the ethyl and hexanoic salt derivatives discussed is under current investigation. [This study was supported by NSF HRD-0627276 and DOE-DE-FG02-03ER63580, Morgan State University, Baltimore, MD 21251.]

## 142. Thermal and X-Ray Diffraction Properties of Nanocomposites at Various Percent Composition

*Racquel Jemison, Morgan State University*  
*Alvin P. Kennedy, Morgan State University*  
*Eugene Hoffman, Morgan State University*  
*Solomon Tadesse, Morgan State University*

Nanocomposites are polymer composites using inorganic nanoclays as fillers. Nanoclays are polymerized with resins and curing agents to form polymers with superior strength, heat resistance, and barrier properties. The long-term objective of this project is to monitor the polymerization process of nanocomposites in situ. Several experiments were performed as preliminary steps toward reaching this overall goal. The first used the differential scanning calorimeter (DSC) to examine the  $T_g$  (glass transition temperature), polymerization exotherm, and extent of reaction of two thermosets: Epon 828 and 825 cured with 4,4'-diaminodiphenylmethane (DDM). The results showed how resins of higher molecular weights and longer cure times yield higher  $T_g$  values. The second experiment prepared nanocomposites of Epon 828 and DDM. Past studies have found that sonication is the most effective method and was thus used in this experiment. Three nanocomposites were prepared of different percent loadings (1, 3, and 5%), and all were heated before sonication. The data to be presented will be the  $T_g$ , extent of reaction, and extent of exfoliation (found by using

X-ray diffraction). The nanocomposites'  $T_g$  values were higher than those of thermosets, whereas the polymerization exotherms were approximately the same. Thus far, the data show that the 3% nanocomposite has been exfoliated.

## 143. Correlated Transition State for the Reaction of Phenol with Formaldehyde

*Julaunica Tigner, Tuskegee University*  
*Melissa S. Reeves, Tuskegee University*

The reaction of phenol with formaldehyde produces a resin with many industrial uses due to its mechanical strength and heat resistance. The initial reaction between phenol and formaldehyde can be carried out under basic aqueous conditions, producing a resole. We will present reactive intermediates and correlated transition states for the para and ortho attacks of formaldehyde on phenol. These results required the presence of both a solvent field and an explicit water molecule. We also studied the different molecular orbitals of the phenol-formaldehyde system for the reactive intermediate and the transition state. Calculations were performed with two different density functional theory methods: B<sub>3</sub>LYP and MPW1K. [Funding was provided by National Science Foundation (NSF)/REU and NSF/IGERT grants at Tuskegee University.]

## 144. Tetraethyl Orthosilicates for the Preparation of Phenol/Formaldehyde Nanocomposites

*Zachary Whitfield, Tuskegee University*  
*Adriane Ludwick, Tuskegee University*  
*Mary Rogers, Tuskegee University*

The objective of this project is to improve the physical properties of phenolic resoles. Previous studies conducted with layered nanosilicates incorporated into phenolic polymers have shown improvements on the polymers' properties. A recently reported study using commercial phenolic resoles and tetraethoxysilane (TEOS) also showed improvements in the properties. In this study, the approach to incorporating the nanosilicates in the polymer was by creating a sol-gel with TEOS. This process was performed on various swelled cured phenolic resole samples prepared in this work. Previous studies have shown that a mixture of p-bromophenol (PBP) and phenol in the preparation of the phenolic resole improved the properties of macrosilicate composites. In this study, a 1:1 phenol/PBP formaldehyde phenolic resole system is being tested in comparison with a phenol formaldehyde system. The results reported will focus on the experimental approach developed to produce void-free polymers and the best solvents for swelling the polymer. The results from spectroscopic, thermal, and mechanical testing of the polymer systems prepared will also be presented.

## Student Oral Presentations Session 8

Friday, October 5, 2007 (3:30 pm -5:30 pm)  
Independence D

### COMPUTER SCIENCES AND MANAGEMENT INFORMATION SYSTEMS

#### 145. Logic-Based Common Sense Reasoner

Patrick Asata, *Bowie State University*  
Darsana Josyula, *Bowie State University*  
Moksha Dashi, *Bowie State University*

First-order theorem provers cannot be used in common sense applications where contradictory data are the norm rather than an exception, since in first-order logic from a contradiction, everything follows. Active logic is a logical formalism that allows handling contradictory information elegantly more or less the way humans do—note that there is a problem, assess the situation, and guide a response strategy in place. The mechanism that permits implementing such an NAGcycle in active logic is the method that active logic uses to derive new formulas from known formulas. In active logic, the rules of inference (e.g., modus ponens) are applied once to formulas known at a step to derive the formulas for the next step. Thus, when a contradiction occurs at a step, it can be immediately noted at the next step and action can be taken to deal with the contradictory formulas.

#### 146. Data Analysis Methodology for Sand Rat Model: Reengineering BI-9000AT Program

Kimberly Davis, *Talladega College*  
Syed Raza, *Talladega College*

Reengineering contains a plethora of software analysis and restructuring techniques that could be used to assist the exportation problem encountered by the BI-9000AT Digital Autocorrelator program. BI-9000AT does not have the ability to automatically perform statistical functions or the log transformation needed for data analysis or interpretation from data collected by a NASA-developed fiber optic device. BI-9000AT is a digital, high-speed, signal processor that is used as an auto- or cross-correlator for dynamic light scattering (DLS) measurements performed in the eye. The sand rat, *Psammomys obesus*, is unique in that it is a nutritionally induced animal model for non-insulin dependent diabetes mellitus (NIDDM) or type 2 diabetes mellitus (T2DM). Complications seen in diabetics such as blindness due to cataracts can be studied using the sand rat as a model. DLS can be used to detect cataracts at the early stages. A Sand Rate Data Analysis Model (software) was developed to be used with the BI-9000AT to efficiently and accurately calculate several data files at one time. Thus, study data can be analyzed at the time of collection from the animals for the investigation of various aspects of ocular health (specifically lens opacity) as a possible early indicator of diabetes mellitus.

#### 147. Heat Topology Analysis of a Scalable Parallel Algorithm for Simulating the Control of Steady-State Heat Flow Through a Metal Sheet

Linda King, *Central State University*  
Billy Jones, *Central State University*  
Robert L. Marcus, *Central State University*

The objective of this research project is to determine the heat topologies of a scalable parallel algorithm that simulates the control of steady-state heat flow through a metal sheet. The algorithm simulates a square metal sheet with the initial conditions of heat of 100° applied to some edges and an ice bath of 0° applied to the other edges. The program performs these

simulations using a parallel row-wise decomposition method with grid sizes of 100 × 100, 200 × 200, and 400 × 400 for the sheet. Various numbers of compute nodes were used to determine speed-up and scalability of the algorithm. The algorithm tracked the temperature of the middle cell of the sheet under changing heat settings of the edges and displayed the heat topologies using MATLAB surface plots.

#### 148. Virtual Private Networks

Tris Maddox, *Savannah State University*  
Ijaz Awan, *Savannah State University*  
Tim Cannon, *Savannah State University*

Virtual private networks (VPNs) are growing in popularity because of their ability to reduce WAN costs. Tempering this growth trend is the difficulty of providing useful redundancy so that network operations can continue uninterrupted despite failures that disrupt the ability of a particular link to carry traffic. The underlying challenge is that useful redundancy requires the ability to detect when a link is down so that an alternate link, such as dial backup or a VPN through another ISP can be used. If a failed link is not detected, it becomes a black hole for all traffic attempting to use that link. Link failure detection is normally provided by link layer keep alive or a routing protocol at the network layer. The problem is that neither approach, as used with conventional network links, works with IPsec tunnels. Today, VPNs are equally appealing to companies of all sizes. Even small businesses are finding compelling reason to implement VPNs. Many view VPNs as a competitive advantage, specifically because of their global coverage and the relative ease with which they can be extended to create extranets. This research will lead to a presentation showing our conclusions on how VPN delivers tangible business benefits, with accurate communications and significant cost savings versus other remote access solutions.

#### 149. Use of a the Geographic Information System for Geospatial Monitoring of Sewage Sludge Application

Bryan Smith, *Central State University*  
K.V. Nedunuri, *Central State University*  
S.I. Sritharan, *Central State University*  
Bartina Smith, *Central State University*

This preliminary study describes a spatial representation of sludge application on agricultural fields in Greene County, Ohio. A geographic information system (GIS) was used to develop a watershed representation for Greene County, Ohio, that includes different layers showing environmental protection agency (EPA)-permitted sludge applied parcels, background soils, land topography, land use, drainage network, and water quality. A database of heavy metal content in the sludge was developed by digitizing the historical sludge application records obtained from the Dayton Wastewater Treatment Plants, Ohio. This database was linked to the GIS layers to facilitate mapping of heavy metal loading onto agricultural fields within Greene County, Ohio. The power of the GIS to extract information across the layers to study relationships between sludge applications, metal concentration, proximity to the residential areas and water bodies, and water quality will be presented. GIS can serve as a guide and a decision-making tool to future sludge applications in ascertaining their impact on physical, chemical, and biological integrity of the watershed. This tool can further pave the way for advanced studies such as predicting the fate and transport of nutrients and metals away from the application areas to water bodies and practices required to contain their movement.

# Abstracts

## Student Oral Presentations Session 9

Friday, October 5, 2007 (3:30 pm -5:30 pm)  
Independence E

### ECOLOGY, ENVIRONMENTAL & EARTH SCIENCES

#### 150. Observations and Assessment of Outer Rainband Tornadoes Spawned by Hurricane Katrina

Keith Goodman, Norfolk State University  
Wen Chau Lee, National Center for Atmospheric Research

While it is common for tornadoes to occur in conjunction with land-falling tropical cyclones, characteristics of the hurricane-spawned tornadoes themselves remain poorly documented. This study 1) documents and describes supercells embedded within the outer rainbands of Hurricane Katrina (2005) and 2) compares Katrina's supercell storms to past studies containing documented hurricane-spawned tornadoes. Radar reflectivity and velocity data collected on August 29, 2005, by WSR-88D (NEXRAD) radars in Slidell, Louisiana, and Mobile, Alabama, were used to track the supercells. Atmospheric soundings from August 29, 2005, showed that environmental conditions were comparable to those in previous hurricane-spawned tornado studies. Twenty-three storms from 0300 UTC–0900 UTC were tracked, and single-Doppler radar analyses examined characteristics such as shear and rotational velocity. Storms were initially classified as mesocyclonic or non-mesocyclonic and were then classified as tornadic if they reached 18 meters/second (Fo intensity) at any time during their duration. Because tornadoes are not resolvable several kilometers from the radar, the intensity of the mesocyclone was used to infer the occurrence of a tornado. Eighteen of Katrina's supercells were classified as tornadic, three reached mesocyclone strength but never reached Fo intensity, and two storms never reached mesocyclone criteria. Remarkably, the majority of the supercells formed over the Gulf of Mexico and not over land, which contrasts with previous studies. Furthermore, the ground-relative speeds of these tornadic mesocyclones in the outer rainbands can reach strong Category 4 intensities, despite sustained winds in Katrina's only reaching Category 3 at landfall.

#### 151. Nutritional Evaluation of Black-Eyed Peas Grown with and without a Cover Crop

Emma Owens, Tuskegee University  
A.C. Bovell-Benjamin, Tuskegee University  
P.N. Gichuhi, Tuskegee University  
K. Kpombrekou-A, Tuskegee University

Worldwide production of black-eyed peas (*Vigna unguiculata* L. Walp), also known as the southern pea, crowder pea, or cowpea, has increased dramatically over the past two to three decades. The black-eyed pea is native to West Africa and is an important source of protein in many developing countries. It has been hypothesized that crops grown with a cover crop are more nutritious than those grown without. This study evaluated the nutritional content of the black-eyed pea grown with (COVCR) and without ryegrass cover crop (NOCOVCRC). The proximate composition, color, and fiber content of the peas were measured. Moisture was determined by the oven-drying method, ash by heating the sample at 550°C for 12 hours, fat with Soxhlet apparatus using petroleum-ether, and fiber content using the ANKOM Fiber Analyzer. Color was determined with a handheld chroma meter using the L\*, a\*, b\* color system. A Student's t test was used to determine whether there were differences between the samples. Black-eyed peas grown with and without cover crop had mean moisture contents of 11.5 ± 0.35% and 11.2 ± 0.14%, respectively. Mean fat contents were 0.5 ± 0.04% for peas grown without cover crop versus 0.4 ± 0.07% for peas with cover crop. Ash contents of the peas varied with a mean of 3.3 ± 0.08%

for those grown without cover crop and 3.3 ± 0.10% for those grown with a cover crop. The L\* values for the COVCR and NOCOVCRC were 65.3 ± 0.39 and 65.3 ± 0.97, respectively. The a\* and b\* values were 3.6 ± 0.10 and 11.8 ± 0.30 for those grown without cover crops. COVCR had a\* and b\* values of 3.6 ± 0.30 and 12.0 ± 0.50, respectively. Fiber content of the peas was 4.6 ± 0.45% for NOCOVCRC versus 5.0 ± 0.47% for peas grown with a cover crop. Results from this study indicated that black-eyed peas grown with and without the ryegrass cover crop had similar nutritive composition.

#### 152. Soil Sampling and Analysis for Lead and Arsenic Contamination in Seven New Orleans Post-Katrina Neighborhoods

Valencia Quarles, Dillard University  
Lovell Agwaramgbo, Dillard University  
Deneyelle Wilson, Dillard University  
Jerrard Smith-Hopkins, Dillard University

Prolonged lead exposure can lead to mental retardation and damage to the central nervous system, reproductive systems, and the developing fetus, while arsenic is known to cause various cancers. The Environmental Protection Agency (EPA) report of December 2005 states that of the more than 150 post-Katrina sediment samples from New Orleans, only three samples exceeded Louisiana's permissible exposure limit (PEL). The report went further to say that the levels of sediment contamination in New Orleans are not expected to cause adverse health effects, provided that individuals use common sense, good personal hygiene, and safety practices. However, in February 2006, the Natural Resources Defense Council (NRDC) reported their analysis of EPA data and concluded that sediments from most districts in New Orleans contained arsenic and lead above levels that would normally trigger investigations and soil cleanups in Louisiana. The arsenic and lead PEL levels are 10 and 400 mg/kg, respectively, whereas the Louisiana Risk Evaluation Corrective Action Program (RECAP) arsenic and lead levels are 12 and 400 mg/kg, respectively. We decided to sample the top 1 cm of undisturbed sediments from more than 90 sites in seven New Orleans residential neighborhoods. Each of the 20 samples tested so far was sieved and prepared for analysis using a Niton X-Ray Fluorescence multi metal analyzer, which was calibrated and further tested with NIST lead and arsenic standards. Only about one-third of the samples had been analyzed and about 36% of them have lead levels above the PEL and RECAP values, whereas 71% of the samples has arsenic above PEL and RECAP levels, respectively. For example, a sample from the Garden District had lead and arsenic levels of 617.2 and 33.8 mg/kg, respectively, whereas the Carrolton uptown sample had lead and arsenic levels of 1,367 and 17.6 mg/kg, respectively. Future studies will screen terrestrial vegetables for lead uptake from contaminated soil sites.

#### 153. Environmental Health Studies on the Peconic River Complex: Sediment Chemistry

Ha 'Wanna St. Cyr, Southern University at New Orleans  
Murty S. Kambhampati, Southern University at New Orleans  
Timothy Green, Brookhaven National Laboratory

Our hypothesis was that the Peconic River headwater sediments would be acidic, nutrient poor, and free of contaminants. There would be no significant difference in means of physico-chemical factors between groups and within groups. Eight surface sediment samples at 150-m intervals were collected and saved in 250-mL Nalgene bottles. Sampling sites were plotted, using an eXplorist 200 Global Positioning System (GPS). Air-dried samples were used to measure macro- and micronutrients using LaMotte Soil Test Kits (pH, K, P, Ca, Cl, Mn, Fe, Pb, Al). Sediment moisture was obtained by drying samples in an oven at 65°C for 36–48 h. Air-dried samples (5 g) were digested using the EPA 3050B method and prepared for inductively coupled plasma (ICP) analysis. The sediments were acidic (6.00 ±

0.00 to  $6.25 \pm 0.94$  at LH3 and LH5, respectively) and nutrient poor. Moisture content varied between  $33.46 \pm 9.67$  to  $68.11 \pm 6.67\%$  at LH1 and LH4, respectively. Most of the sediments have excessive amounts of Al and Fe in natural versus remediated sites ( $11,090 \pm 2,010$  vs.  $4,469 \pm 832$   $\mu\text{g/g DW}$  and  $3,078 \pm 607$  vs.  $2,780 \pm 578$   $\mu\text{g/g DW}$ , respectively). Our studies indicated Pb concentrations are higher in natural sites ( $138.5 \pm 30.62$   $\mu\text{g/g DW}$ ) compared to the remediated sites ( $89.22 \pm 14.67$   $\mu\text{g/g DW}$ ). We have also observed that sediments of PR natural sites have higher concentrations of metals (Al, Fe, and Pb) than the remediated sites. In some instances, however, current elemental contents of Al, Cd, Fe, Pb, Mg, and K in sediments of remediated sites were greater than the earlier observations. Experimental results were in partial agreement with our hypothesis (nutrient poor and acidic). However, we reject the null hypothesis, since our hypothesis was proven wrong regarding contaminants and mean differences among the groups of data sets. We have also observed that sediments of PR natural sites have higher concentrations of metals (Al, Fe, and Pb) than the remediated sites. In some instances, however, current elemental concentrations of Al, Cd, Fe, Pb, Mg, and K in sediments of remediated sites were greater than the earlier observations (2003 and 2005).

#### 154. Environmental Health Studies of the Peconic River: Water Chemistry

*LaTonya Stemley, Southern University at New Orleans*  
*Murty Kambhampati, Southern University at New Orleans*  
*Tim Green, Brookhaven National Laboratory*

The purpose of this research was to collect scientific environmental health data on water from the remediated and natural sites of Peconic River (PR) headwater complex at Brookhaven National Laboratory (BNL) and to compare results with available earlier findings. The specific objectives were to 1) analyze samples for physico-chemical factors, 2) compile and analyze data statistically, and 3) identify the interrelationships between abiotic factors. Headwaters of the Peconic River would be acidic with excessive turbidity, be nutrient poor, have low dissolved oxygen (DO) levels, and be free of contaminants. There would be no significant difference in means of physico-chemical factors between groups and within groups. We have collected 54 surface water samples (<15 cm deep at 150-m intervals) randomly from seven experimental sites (LH1–7). Experimental sites were plotted using the eXplorist 200 Global Positioning System (GPS) and ArcInfo Geographic Information System (GIS). Field data were obtained on DO, temperature, pH, turbidity, and conductivity using a Yellow Spring Instruments (YSI) probe. Water samples were analyzed using a Hach DR890 colorimeter. Filtered and acidified water samples ( $\text{pH} < 2$ ) were used to estimate metal content using an inductively coupled plasma spectrometer (ICP). Water was acidic ( $4.61 \pm 0.10$  to  $5.87 \pm 0.04$  at LH2 and LH5, respectively) and low in DO ( $1.49 \pm 0.17$  to  $5.67 \pm 0.70$  mg/L at LH3 and LH1, respectively). Samples had traces to zero Cl, NO<sub>2</sub>, and NH<sub>3</sub> nitrogen. Alkalinity ranged from  $10.5 \pm 5.65$  mg/L at LH2 to  $83.13 \pm 3.26$  mg/L at LH7. Among various physico-chemical factors analyzed using one-way ANOVA, mean differences between groups (LH1–LH7;  $df = 6$ ) for temperature, conductivity, DO, ammonia nitrogen, tannin, sulfate, phosphorus, suspended solids, alkalinity, and total hardness were highly significant ( $p < 0.05$ ). A two-tailed independent sample T-test between two zones ( $df = 52$ ) indicated significant mean differences ( $P < 0.05$ ) in data for various chemical factors. Two-tailed Pearson correlations indicated significant relationships between various physico-chemical factors at  $p < 0.05$  and  $p < 0.01$ . Experimental results were in partial agreement with our hypothesis (nutrient poor, low DO, and high turbidity). However, we reject the null hypothesis, since our hypothesis was proven wrong regarding contaminants and mean differences among the groups of data sets. We have also observed that water of PR natural sites have higher concentrations of metals (Al, Fe, and Pb) than in the remediated sites.

#### 155. Investigation of Lead Uptake, Accumulation, and Sequestration by Tomato Plants (*Lycopersicon esculentum*)

*Deneyelle Wilson, Dillard University*  
*Lovell Agwaramgbo, Dillard University*  
*Jose Ramirez-Domenech, Dillard University*

Reports after hurricane Katrina revealed the existence of major environmental contamination before and after Katrina, especially lead at levels above the Environmental Protection Agency PEL (permissible exposure limit) and RECAP (Louisiana Risk Evaluation Corrective Action Program) limits in sediments found in most districts in New Orleans. Preliminary studies on the uptake of contaminants by garden plants, such as tomato plants (*Lycopersicon esculentum*), are needed to further our understanding of contaminant phytotoxicity, exposure pathway, and effects on plant growth, development, and productivity. The potential for contaminant plant uptake and propagation into the food chain poses great health risks. More importantly, residents returning to their flooded homes are concerned about the long-term impact of the contaminants and the safety of their homegrown vegetables and fruits. Many studies have shown that some plants have the ability to uptake and accumulate contaminants. Thus, in an effort to find answers to residents' concern about lead uptake by garden vegetables and fruits, our preliminary studies wanted to investigate if tomato plants can uptake, accumulate, and sequester lead from a contaminated hydroponics medium. For this investigation, lead nitrate was chosen as the source of lead, which is a major environmental contaminant in New Orleans because of its solubility. The tomato plants were chosen because they are among the common garden vegetables and fruits in New Orleans and are readily available at the local stores.

#### Student Oral Presentations Session 10

*Friday, October 5, 2007 (3:30 pm -5:30 pm)*  
*Wilson Room*

#### TECHNOLOGY AND ENGINEERING

#### 156. Effect of Compacting Pressure and Sintering Temperature on Copper Powder Metallurgy

*Joe Allain Dollete, Virginia State University*  
*Nassen Ghariban, Virginia State University*

Powder metallurgy (PM) is a process by which fine powdered materials are blended, pressed into a desired shape, and then heated to achieve desired properties. Powder metallurgy has become competitive with processes such as casting, forging, and machining. Parts made by this process have high dimensional accuracy with relatively complex geometry. An experimental study has been conducted to investigate the parameters effecting the dimensions and mechanical properties of the PM parts. Standard samples of PM products were manufactured in the lab under different pressure and sintered under various ambient conditions. Mechanical tests were performed on the parts to find correlations between the manufacturing parameters and mechanical properties of the products.

#### 157. Thermo-Mechanical and Flexural Properties of Nanoclay/SC-15 Epoxy-Polyether Polyol Nanocomposites

*Shawn King, Albany State University*  
*Mahesh V. Hosur, Tuskegee University*

During this eight-week summer research project, we prepared different composite matrix samples containing sc-15 epoxy, different percentages

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of 1.30E nanoclay, and polyol. Components were mixed using a magnetic mixer rotating at 1,200 rpm and at a temperature of 60°C. It was important to maintain a temperature near 60°C, because a temperature either lower or higher would cause results to vary. The samples were cured at room temperature for 24 hours and later post-cured at 500°C for five hours. Tensile tests were performed on the different samples at a crosshead speed of 1 mm/min to determine the behavior of our samples when subjected to axial stretch loading. This provided us with various physical properties of our samples: average peak stress (MPa), average strain at failure, and the tensile modulus (GPa) for each set of samples. A stress/strain curve was then plotted. Flexure tests were also performed on samples of dimension 100 × 20 × 4.8 (L × W × D) at a crosshead speed of 2 mm/min to determine the behavior of materials when subjected to simple beam loading. During these tests, maximum fiber stress and maximum strain was calculated for increments of load. The results were plotted on a stress/strain curve.

## 158. The Ultimate Microprocessor Trainier

*Manan Thakkar, Virginia State University*

*Ali Ansari, Virginia State University*

Most universities that have classes on microprocessors focus on Intel 80X86 based systems have a difficult time putting the lessons taught in the class room into practice. This is because there are not many other microprocessor systems available. The universities that do have stand alone systems have an advantage to teach the students the differences in each individual microprocessor. Unfortunately there are no new systems available for students and universities to purchase; so much of the equipment is out of date. This becomes a problem because it is very difficult to maintain a product that is no longer in production.

The focus of this research is to construct a microprocessor system that will be cost efficient and give the same educational value as previous systems. This system will be constructed using a single board computer. This single board computer will act as the microprocessor. This microprocessor will give the student the same education that they would receive on the previous system, and would correlate directly to the curricula in the class. This education would include manipulating the microprocessor through the software as well as using indicators, LED's, and input/output lines. Also the students will be able to manipulate electronic circuit built on the breadboard. This system would also be affordable enough that students could also purchase the system. The benefit to the student would be great. At the time of purchase the student will also receive a lab manual with practice labs. This will give them a good base knowledge of the system as well as offering the opportunity to design their own labs. By doing this they will become more efficient at programming and realize the endless possibility of the system. So the student will be familiar with the system, when purchased, they will receive a lab book. This book would contain labs of various difficulties so they can progressively learn the capabilities of the system.

## 159. Analysis of Taylor Series-Based Backwards Difference Method Truncation Errors in Engineering Numerical Methods

*Jared Williams, Savannah State University*

*Jonathan P. Lambright, Savannah State University*

Using mathematical models to predict the behavior of physical systems is an important part of engineering analysis, and the techniques of numerical methods are important tools that are used to facilitate the mathematical modeling process. In particular, numerical methods can be used in approximating derivatives and solving nonlinear equations. This research focuses on the analysis of truncation errors in the Taylor Series-based Backwards Difference method. The Euler method lays the groundwork for the Taylor series expansion. Specifically, this research will focus on ana-

lyzing the effects of truncation and the resulting errors when using the different numerical techniques. This research investigates the technique of adding additional terms in the backwards difference method to affect results accuracy. In addition, combined with increasing the number of terms, this research investigates the affects of reducing the step size upon the results accuracy and the number of iterations to produce the desired accuracy. The instructional techniques and algorithms developed in this research will be used to compute approximations and facilitate teaching numerical techniques to students in the classroom.

## 160. Effects of an Internal Fixation Device on Stress Distributions within Forearm Long Bones

*Mykal Woody, Savannah State University*

*Cameron Coates, Armstrong Atlantic State University*

There is not a general consensus among doctors whether internal fixation devices for forearm long bone fracture repair should be retained after the fracture has healed. The literature regarding stress distributions near the plates after the fracture has healed (and plates have been retained) is relatively scant. In this work, the finite element method (FEM) is used to predict stress distributions in the forearm long bones with and without an internal fixation device attached, to examine these distribution differences. To develop the physical models, plastic bone replicas are lightly powdered with talcum powder and pressed into modeling clay to form a mold. Hydrocal is then placed in the mold and allowed to harden for several hours. Bone geometry is imported into an FEM program by scanning thinly sliced cross-sections of the model. Forearm long bones are then subjected to torsional, tensile, and bending loads under a cantilever end condition using FEM. Each model consists of approximately 25,000 solid parabolic tetrahedral elements having three degrees of freedom per node. Trabecular and cortical bone were modeled as orthotropic and isotropic materials, respectively. Tensile and bending load simulations indicate that the normal stress values are reduced only along specific localized paths in both bones. Similarly, results from the torsional and bending load simulations show that the presence of the plates serve to reduce transverse shear stresses along a limited number of localized paths. [I would recommend re-wording this section to make it much more compact. It is currently a bit long] Low-cost physical models have been developed that, when imported into FEM software, yield results comparable to FEM results obtained from more expensive modeling techniques. FEM predictions of stress reductions along specific planes were consistent with experimental results from current literature. However, the holes introduce stress concentrations, which negate or reverse stress reductions along other planes. Though stress shielding and decreased vascularity may result in a reduction in bone strength along certain planes, higher stresses along or across other planes will result in increased bone density at these locations according to Wolff's law. Overall remodeling response to static loads of long bone with retained fixation devices post-healing should not only account for stress shielding and reduced vascularity due to contact stresses, but should also include the effect of increased stresses along planes in the vicinity of the holes.



**Student Oral Presentations Session 11**

*Saturday, October 6, 2007 (9:45 am –11:45 am)*  
*Wilson Room*

**SOCIAL AND BEHAVIORAL SCIENCE****161. African-American College Students: Is a College Degree Enough to Eliminate the Disparities of Poverty?**

*DeSha Farmer, Pulaski Technical College*  
*Nancy Greer-Williams, Arkansas Baptist College*  
*William Rutledge, Arkansas Baptist College*  
*Ronnie Cato Ridley, University of Arkansas at Little Rock*

On the brink of the 21st century, many citizens continue to struggle with income and job disparities. The good news is that more people are trying to improve their economic status through higher-education degrees. On the one hand, parity for women appears within reach. Minorities, on the other hand, remain dramatically underrepresented in leadership roles in higher education, government, business, and industry. A report on poverty reported that over 50% of African-American and Hispanic families have incomes of less than 150% of the poverty level (SSS,1997). Researchers conducted a qualitative pilot study on African-American college students at a historically black college in Arkansas to determine if the acquisition of a college degree was sufficient to overcome the disparities of poverty.

**162. An Exploration of Sexually Transmitted Disease (STD) Risk Behavior in Incarcerated Adults**

*Lauren Wagner, Norfolk State University*  
*Samantha Williams, Centers for Disease Control and Prevention*

The number of incarcerated adults in the United States is substantial. Jail and prison environment and culture may be high-risk determinants for acquiring sexually transmitted diseases (STDs) and/or HIV. The following project explores various risk factors that may contribute to STD risk behavior and the policies that may also affect them. The hypotheses stated that high STD risk behavior and policies contribute to the prevalence of STDs in incarcerated adults. A literature review was conducted to explore existing information concerning STDs, corrections, and policy. The literature review concluded that many factors including risks before incarceration, risk while incarcerated, and risk once released all contributed STD risk behavior. Policies such as lack of condom distribution, lack of intervention/prevention programs, and the “war on drugs” may also contribute to STD risk behavior. From the existing information, a mock design study was also created to simulate the distribution of condoms in a male prison. In the mock design study, condoms were distributed on one floor in a male prison versus no condom distribution of condoms in another male prison of similar demographics and HIV prevalence. Though this study explored many factors that can contribute to STD risk behavior, more research should be conducted in the area of STD risk behavior among incarcerated adults, and the efficacy of government policies should be assessed.

**Packard Scholars Poster Presentation Abstracts****Session I**

*Friday, October 5, 2007 (2:00 pm–3:00 pm)*  
*Independence B & C*

**163. Numerical and Experimental Investigation of Ions in a Homogeneous Charge Compression Ignition (HCCI) Engine**

*Presenter: Gregory E. Bogin, Jr., 2003 Scholar, University of California, Berkeley*

*Contributors: Parag Mehresh, University of California, Berkeley;*  
*Robert W. Dibble, University of California, Berkeley*

There is a steadily increasing concern that the products of combustion of fossil fuels are eroding our environment, causing problems with the earth's protective ozone layer and overall human health. These concerns are augmented by the fact that fuel consumption is steadily increasing. For these reasons, any improvement in fuel efficiency, while reducing pollutant emissions, is highly desirable. Homogeneous charge compression ignition (HCCI) is the ideal engine for addressing these problems. HCCI engines have high thermal efficiencies, due to a high compression ratio (comparable to Diesel engines), low NO<sub>x</sub>, and low particulate emissions due to a homogeneous mixture with a lean equivalence ratio (and thus low combustion temperature). Determining when combustion occurs in an HCCI engine can prove challenging given that the combustion process is governed by temperature-sensitive chemical kinetics, which results in auto-ignition of the fuel/air mixture. Auto-ignition variability can affect emissions and efficiency; thus, predicting and controlling the combustion event is of the utmost importance. Ion sensors can be used accurately to predict the start of combustion for various fuels used in HCCI engines. Sparkplugs converted to ion sensors have the potential of replacing the more costly and less robust pressure transducers. Currently, our focus is in modeling chemical kinetics for various fuels and experimentally measuring ions for predicting combustion events in an HCCI engine.

**164. Effect of Chemical Mixture on Larval Development in *Xenopus laevis***

*Travis M. Brown, 2002 Scholar, University of California, Berkeley*

Atrazine, a ubiquitous herbicide that induces the enzyme aromatase in each class of vertebrate, has been shown to cause gonadal feminization in male *Xenopus laevis*. Decreased laryngeal size and lowered testosterone levels also result from exposure to the single pesticide. In the field though, animals are exposed not to one chemical, but a myriad of compounds that may result in different endpoints. Here, I exposed male and female *Xenopus laevis* to five treatments: negative control (ethanol vehicle), positive control (17 beta-estradiol), 1.0 ppb atrazine, and two doses of a chemical mix modeled after mixtures found in corn-growing regions of the United States. The experiment was performed blind, and data are currently being analyzed. Preliminarily, there was no significant difference between treatments in time to metamorphosis, size at metamorphosis (body weight and snout-vent length), and mortality. Sex ratio was normal (50% male/50% female) for all treatments except for the E2 treatment. Sex reversal was 100% effective. Histology was performed on every other animal to metamorph, and the data are currently being analyzed. No obvious hermaphrodites have been found, but gonadal abnormalities have been noted. One reason hermaphrodites have not been found in this study is that differing amphibian populations may respond differently to exposure to the same chemical. A reassessment of amphibian data with this in mind is necessary.

# Abstracts

## 165. Mechanisms of Axonal Degeneration in Toxic Neuropathies Identified By Compartmentalized Culture System

*Presenter: Kavan T. Clifford, 2003 Scholar, Johns Hopkins University School of Medicine*

*Contributors: Ahmet Hoke, Johns Hopkins University School of Medicine*

**Background:** Distal axonal degeneration is a common feature of many peripheral neuropathies, including toxic neuropathies. Although cellular events leading to Wallerian degeneration are known, mechanisms underlying distal axonal degeneration are not well studied. **Methods:** We examined mechanisms underlying axonal degeneration in toxic neuropathies induced by ddC, paclitaxel, cisplatin and acrylamide using a compartmentalized culture system, which allows physical separation between cell bodies and axons and differential manipulation of their environment. **Results:** All four agents caused distal axonal degeneration, but only cisplatin induced apoptotic death of the neuronal cell body at the same dose that induced axonal degeneration. In contrast, paclitaxel required higher doses to cause neuronal death. Axonal degeneration induced by cisplatin was preventable by caspase inhibition, but axonal degeneration induced by ddC, paclitaxel, or acrylamide was not. Similarly, calpain inhibition did not uniformly prevent axonal degeneration. **Conclusions:** This study shows that distal axonal degeneration can be mediated through both caspase- and calpain-dependent mechanisms. Further elucidation of these different pathways of axonal degeneration can lead to a better understanding as to why most peripheral neuropathies affect distal axons.

## 166. Utility of a Comprehensive Polymerase Chain Reaction–Based Assay for the Detection of Herpesviruses

*Presenter: D'Antoni C. Dennis, 2002 Scholar, Louisiana Health Sciences Center*

*Contributors: J.E. Cameron, Tulane University Health Sciences Center; C. Miller, University of Kentucky School of Medicine; M.E. Hagensee, Louisiana Health Sciences Center*

**Background:** Because of the observation that many are infected with herpesvirus (HPV) but few develop HPV-related cervical disease, many investigators have looked at the herpesvirus family as a potential cofactor in this process. To investigate the role of herpesviruses as a potential cofactor, we used a comprehensive polymerase chain reaction (PCR)-based assay to detect five species of herpesviruses in clinical samples in a group of HIV+ women at high risk for cervical disease. When evaluating the results from the study, the detection and identification of some herpesviruses were lower than expected for these women. Although rates of shedding viruses vary based on race, gender, immune status, and other factors, this observation may reflect the relative insensitivity of the assay or a difference in the population studied. **Methods:** DNA from 50 oral swab samples were tested for herpesviruses using the comprehensive assay that targets the DNA polymerase gene of five herpesviruses (HSV-1, HSV-2, EBV, CMV, and KSHV), and the results were compared to a reverse transcriptase (RT)-PCR assay designed for each herpesvirus species using identical samples. **Results:** Overall, the results were 76% concordant. The results were 83% concordant when the sample only had one herpesvirus species, compared to 31% concordance found in samples with multiple herpesviruses. **Conclusion:** The comprehensive assay is sufficient at detecting herpesviruses in clinical samples where there was a single species represented above the lower limits of detection.

## 167. Characterization of Macrophage Scavenger Receptor 1 (Msr1) Modulation of Interleukin-10 Levels in A/J and C57BL/6J Mice During Inflammation

*Robert J. Drummond, 2002 Scholar, Johns Hopkins School of Medicine*

*Contributors: Anh Pham, University of California, San Diego, School of Medicine; Antonio DeMaio, University of California, San Diego, School of Medicine*

Septic shock is a major complication observed after trauma and infection and is likely the product of a prolonged and poorly controlled systemic inflammatory response. The inflammatory condition can be reproduced in an endotoxemia mouse model by injection of bacterial lipopolysaccharide (LPS) into mice. Differences in mortality between C57BL/6J(B6) and A/J mice after LPS injection have been correlated with differences in the inflammatory response between these two inbred strains. Inbred analysis of B6  $\times$  A/J pups identified a locus on chromosome 8 that appeared to modify the levels of interleukin (IL)-10 after an LPS challenge. Consomic studies confirmed this linkage, and haplotype analysis further reduced the locus down to a 24-cM region of Chr8. Macrophage scavenger receptor 1 (Msr1) within this locus emerged as a candidate gene. Comparison of A/J and B6 Msr1 haplotypes revealed nine polymorphisms between the two strains of mice. Initial experiments showed that protein expression levels between the A/J and B6 strains were also different. When comparing A/J and B6 mice after LPS challenge, B6 mice repeatedly responded with a higher secretion of IL-10. In contrast to wild-type B6 mice, Msr1 knockout mice (Msr1<sup>-/-</sup>) on a B6 background displayed reduced levels of LPS-induced IL-10, but not of TNF-alpha or IL-6, thus showing the specific role for this gene in the regulation of IL-10. Our goal is to elucidate the functional mechanisms behind Msr1 modulation of IL-10 during inflammation.

## 168. Solid Oxide Fuel Cell Temperature Field Evolution During Thermal Cycling

*Presenter: James C. Ford, 2003 Scholar, Georgia Institute of Technology*

*Contributors: Dr. Comas Haynes, Georgia Tech Research Institute; Dr. Samuel Graham, Georgia Institute of Technology; David Damm, Georgia Institute of Technology*

Solid oxide fuel cells (SOFCs) are high temperature (600–1,000°C) power sources that are considered viable alternatives for residential grid power, backup generators, and other larger-scale (e.g., 5 kW to 1 MW) power production applications. As is generally ascribed to fuel cells, SOFCs may allow for significantly reduced fuel consumption and emissions (i.e., criteria pollutants, “greenhouse” gases, and noise). Additionally, their higher temperature operation affords the viability benefits of fuel flexibility (i.e., they do not require pure hydrogen-steam) and the preclusion of precious metal catalysts. Despite these latter benefits afforded, the higher temperature operation of these ceramic-cermet composite-layered cells may also lead to excessive thermally induced stresses/shock. This danger is especially noteworthy during thermal cycling, and design/operational protocols must be established accordingly. Such protocols require an accurate, yet viable, characterization approach. Modeling, simulation, and analyses efforts are underway to resolve the spatio-temporal temperature profiles that occur during the “start-up” and “shut-down” modes of SOFC operation. A key phenomenon that is captured is the electrochemical “light off” development, wherein during start-up, intermediate temperatures are reached wherein electrochemical reactions proceed at significant rates and cause attendant heat generation to factor into the thermal evolution. Previously developed models for “inert” SOFC transient heating/cooling and lumped capacitance light off have been integrated in a

pilot manner to perform the stated simulations. The multidisciplinary tool provides researchers and designers insight into dangerous temperature gradient manifestations as functions of operating conditions such as reactant stream flow rates, inlet air temperature, polarization functionality, etc. Aside from analysis, an ultimate capability will be the establishment of thermal cycling protocols based on such resources as “maps” of safe operational dynamics.

## 169. Sn<sub>37</sub>Pb Solder Durability versus Sn<sub>3.0</sub>Ago.5Cu Solder Durability

*Presenter: Patrice B. Gregory, 2003 Scholar, University of Maryland College Park*

*Contributor: Donald Barker, University of Maryland College Park*

The durability of lead-free Sn<sub>3.0</sub>Ago.5Cu solder under shock and cyclic loads has been investigated. The results are compared to previous tests involving Sn<sub>37</sub>Pb eutectic solder. The board was fabricated with two plastic ball grid array (PBGA) packages and organic solder preservative (OSP) was used as the board finish. A four-point bending setup was used, and the printed wiring board strain was measured. The results show that the typical low-cycle fatigue to high-cycle fatigue transition region that exists for lead solders does not exist for the lead-free solder. It is also shown that Sn<sub>37</sub>Pb is more durable than the Sn<sub>3.0</sub>Ago.5Cu in the low cycle regime but the two are equally durable in the high-cycle regime.

## 170. Oscillation for a Certain Nonlinear Second Order Dynamic Equation on a Time Scale

*Presenter: Raegan J. Higgins, 2002 Scholar, University of Nebraska-Lincoln*

We discuss the oscillatory behavior of the nonlinear second order dynamic equation on a time scale  $T$  with  $\sup T = \infty$ . We establish a sufficient and necessary condition, which ensures that every solution oscillates. Next, we establish the equivalence of the oscillation of the above dynamic equation and the nonlinear second order delay dynamic equation on time scales. Finally, we obtain a comparison theorem for the delay dynamic equation.

## Session 2

**Saturday, October 6, 2007 (11:00 am–12:00 noon)**  
**Independence B & C**

## 171. NusEye: Alleviating Information Overload in Content Aggregators by Supporting Social Navigation

*Presenter: Azzari Jarrett, 2001 Scholar, Northwestern University*

Information sources such as weblogs and news organizations publish updated changes in web content via XML-based specifications in the form of RSS, RDF, and Atom files, or webfeeds. In this way, it is easy to distribute headlines and content to a wide audience of people. Webfeeds are monitored, retrieved, and presented in applications called content aggregators. With the rapid growth of webfeeds, the amount of new information collected by content aggregators can easily become unmanageable for the end user, eventually leading to information overload. NusEye is an information system that provides meta services for syndicated content and exposes the activity of users to each other, supporting social navigation. Social navigation is defined as provoking a user to move through an information space guided by the activity of others in that space. NusEye augments syndicated content with social navigation by allowing users to

apply ad-hoc keywords, or tags, to sources of Web syndicated information (webfeeds). Applied tags are visible to all users in the system and are easily monitored. The major points of design include the selection of an interface in which social communities and networks can form from the use of tags, content analysis that is beneficial for syndicated content, and the presentation of analysis results.

## 172. Stretchable Interconnects for Microelectronics

*Joyelle E. Jones, 2003 Scholar, Princeton University*

*Contributors: Prashant Mandlik, Sigurd Wagner, Princeton University; Stephanie Lacour, University of Cambridge*

We have created thin-film, stretchable interconnects for several types of applications. For electronics that require interconnects patterned over surfaces with rough topologies, we present thin films fabricated on substrates containing hillocks. Lines may be patterned at various angles on these rough surfaces as circuits increase in density and complexity. Therefore, we fabricated interconnects patterned at an angle to the hillocks. Electrical isolation is required for interconnects within layered circuits. Hence, encapsulated stretchable metallization was also constructed. First, 75-nm thick Au lines were patterned by photolithography on two types of poly dimethyl siloxane (PDMS) substrates. The surface of one substrate was flat, while the other substrate's surface contained 250 nm tall hillocks. Next, two different patterns of lines were fabricated by photolithography on the PDMS containing hillocks. One set of lines was patterned so that the stretching direction was parallel to the hillocks. The other set of lines were patterned so that the direction of stretching was at an angle to the hillocks. Finally, lines were patterned by photolithography on flat PDMS surfaces and encapsulated with a second layer of PDMS. All lines were stretched, and the electrical resistance was measured under tensile strain. For up to 20% strain, the resistances of encapsulated lines and lines patterned parallel to the hillocks were comparable to lines patterned by photolithography on PDMS containing a flat surface. The resistance of lines patterned at an angle to the hillocks was several orders of magnitude higher when compared to the other samples. We will discuss the fabrication, morphology, and electromechanical behavior of each type of interconnect.

## 173. Does YouTube Bridge the Gap? Characterizing User-Created Video

*Presenter: Brian Landry, Georgia Institute of Technology*

*Contributor: Mark Guzdial, Georgia Institute of Technology*

The multimedia community has an extensive history of creating novel authoring tools for professionals. However, the proliferation of digital cameras and media-editing software in consumer households has led to the democratization of multimedia content authoring. Despite access to the tools to produce digital media productions, consumer-created content tends not to resemble professional artifacts. In this paper, we explore this disparity by analyzing the popular content on the video-sharing site YouTube to determine 1) the extent to which novice and professional artifacts differ and 2) and how research in the user-created content domain can make an impact. We conclude with a discussion of how new technologies might address this gap in composition proficiency.

# Abstracts

## 174. The $\alpha 2\beta 1$ Integrin Serves as a Receptor for IgE-Independent Mast Cell Activation

*Presenter: Karissa D. McCall-Culbreath, 2003 Scholar, Vanderbilt University*

*Contributors: Zhengshi-Li, Vanderbilt University; Mary Zutter, Vanderbilt University*

The  $\alpha 2\beta 1$  integrin is a collagen, laminin, MMP2, and viral receptor. Studies in our lab showed that expression of  $\alpha 2\beta 1$  integrin on peritoneal mast cells is required for innate immune responses to *Listeria monocytogenes*. The ligand for the  $\alpha 2\beta 1$  integrin in this response is C1q, which interacts with the integrin through a *Listeria*-containing immune complex. The studies presented here identify a novel pathway of mast cell activation that results in interaction between the  $\alpha 2\beta 1$  integrin and serum-opsinized *Listeria*-immune complex. This mechanism of release as early as 30 minutes occurs in the absence of beta-hexosaminidase and independently of calcium. The downstream signaling mechanism of  $\alpha 2\beta 1$  integrin activation appears to differ from Fc( $\epsilon$ )R activation. Characterization of  $\alpha 2\beta 1$  integrin-immune complex activation of mast cells has revealed an Fc( $\epsilon$ )R-independent pathway that is important in broadening our understanding of the role of mast cells in autoimmune diseases with immune complex-mediated inflammation.

## 175. Self-Affirmations and Academic Outcomes

*Presenter: David Myles, 2002 Scholar, Yale University*

*Contributors: Valerie Purdie-Vaughns, Yale University; Geoffrey Cohen, University of Colorado*

In the context of a given standardized test administration, it has been shown that commonly asked demographic questions (i.e., having students identify their race) have demonstrable effects on test outcomes of particular types of students. This is articulated in the theory of stereotype threat (Steele and Aronson, 1995). Those effects are thought to arise, in part, from a student's (or group's) perception that he or she (they) may confirm a stereotype about the group with which they identify when placed in situations where commonly known negative stereotypes about their group are widely known. Given that there exists a panoply of potential triggers of threat in standardized testing, as currently administered, investigators have been searching for ways to minimize the effects that threat has on test and academic performance. Approaches adapted from the theory of self-affirmation have received increased interest. Interventions that induce self-affirmation in students in classroom settings have been shown to reduce the number of non-Asian minorities who perform below-average academically. Although the implications of such interventions are arguably clear-cut, what is not known is (1) whether the self-affirmation intervention induces significant results in college men and women and (2) how self-affirmation mechanistically enhances performance in non-Asian minority students.

## 176. Lane-Change Parameter Estimation Method for One Possible Two-Lane Macroscopic Freeway Traffic Model

*Presenter: Shantisa N. Norman, 2003 Scholar, University of California, Berkeley*

*Contributor: Roberto Horowitz, University of California, Berkeley*

The lane-change parameter estimation model will incorporate the lane-changing behavior of vehicles on a freeway into current cell transmission-like models of vehicle behavior, to improve the models, possibly in the area of the addition of high-occupancy vehicle (HOV) lanes into the models. Currently, a lane-mixing model for a two-lane freeway is being

considered, in which lane-change parameters are specified and then estimated. This estimation is done through an implementation of an extended kalman filtering (EKF) method, by which the lane-change parameters are estimated along with the traffic densities. Simulations involving this method have yielded promising results, in which lane-change parameters that are specified are estimated correctly and densities that are calculated from the freeway performance measurement system (PeMS) seem to follow along as estimated. This work is also being extended into the area of flow estimation, in which the intermediate flows of a given freeway cell will be calculated for incorporation into the mixing model.

## 177. Effectiveness of Content Preparation in Information Technology Operations: Synopsis of a Working Paper

*Presenter: April Savoy, 2002 Scholar, Purdue University*

*Contributor: Gavriel Salvendy, Purdue University and Tsinghua University*

Content preparation is essential for web design. The objective of this paper is to establish a theoretical foundation for the development of methods to evaluate the effectiveness of content preparation in information technology operations. Past study identifies information as the dominant concern of users and delivery mechanism as a secondary concern. The best presentation of the wrong information results in a design with major usability problems and does not aid the user in accomplishing his or her task. This paper shifts the focus of existing usability evaluation methods. It attempts to fill the void in usability literature by addressing the information aspect of usability evaluation. Combining the strengths of content preparation and usability evaluation yields major implications for a broad range of IT uses.

## 178. Synergistic Interaction Between Curcumin Analogs and p38 Mitogen-Activated Protein Kinase (MAPK) Inhibitors

*Presenter: Shala L. Thomas, 2003 Scholar, Emory University*

*Contributors: James Snyder, Emory University; Dennis Liotta, Emory University; Haian Fu, Emory University*

The polyphenol curcumin has been demonstrated to be an effective agent against human cancer cells. This anti-cancer activity has been in part attributed to the inhibition of the nuclear factor of kappa B (NF $\kappa$ B), a transcription factor important for cellular survival. Curcumin-derived analogs, including the fluorinated EF24 compound, were developed with higher potency in *in vitro* and *in vivo* models. To determine the mechanism of this analog, EF24 was found to induce the activation of three mitogen-activated protein kinases (MAPKs): ERK, JNK, and p38 MAPK. We used MAPK inhibitors to determine pathways that are important for EF24-induced cell death. Interestingly, EF24 in combination with p38 MAPK inhibitors elicited cytotoxic synergy based on cell viability assays, combination index (CI) analysis, and colony formation assays. The synergy was associated with the induction of apoptosis as reflected by Poly (ADP-ribose) Polymerase (PARP) cleavage and the accumulation of the sub-G1 fraction in flow cytometry, which are molecular markers of apoptosis. The combination of EF24 and p38 inhibitory compounds was also effective in multiple lung cancer cell lines, possibly because of general upregulation of p38 MAPK by EF24 treatment. These studies suggest that p38 MAPK has a role in the survival response of lung cancer cells and is possibly one of the major survival pathways induced by EF24. Our finding also suggests a potential therapeutic approach for the effective treatment of lung cancer.

### 179. A Systematic Method for Reverse Engineering Biological Systems

*Jamal Wilson, 2002 Scholar, Georgia Institute of Technology*

*Contributor: David Rosen, Georgia Institute of Technology*

The duality between biological systems and engineering systems exists in the pursuit of economical and efficient solutions. By adapting biological design principles, nature's technology can be harnessed. In this research, we develop a systematic method for reverse engineering biological systems to aid the designer in searching for solutions in nature to current engineering problems. Specifically, the proposed method is used as a means for extracting biological strategies from biological systems and using these strategies as creative stimuli in generating functional solutions. It is believed that these biological stimuli can lead to a more "effective" ideation process, causing the designer to both expand and explore more of the design space. We illustrate this method with an example of the design of a variable stiffness skin for a morphable airplane wing based on the mutable connective tissue of the sea cucumber.

## Packard Scholars Oral Presentation Abstracts

### Session I

*Friday, October 5, 2007 (5:00 pm –6:00 pm)*  
*Wilson Room*

### 180. Development of a Leakage Model for Compressive Seals in Solid Oxide Fuel Cells

*Presenter: Christopher K. Green, 2001 Scholar, Georgia Institute of Technology*

*Contributors: Dr. Jeffrey Streator, Georgia Institute of Technology; Dr. Comas Haynes, Georgia Tech Research Institute; Dr. Edgar Lara-Curzio, Oak Ridge National Laboratory*

Fuel cells represent a promising energy alternative to the traditional combustion of fossil fuels. In particular, solid oxide fuel cells (SOFCs) have been of interest because of their high energy densities and potential for stationary power applications. One of the key obstacles precluding the maturation and commercialization of planar SOFCs has been the absence of a robust sealant. A computational model has been developed in conjunction with leakage experiments at Oak Ridge National Laboratory. The aforementioned model consists of three components: a macroscopic model, a microscopic model, and a mixed lubrication model. The macroscopic model is a finite element representation of a preloaded mica-based seal interface, which is used to determine macroscopic stresses and deformations. The micro scale contact mechanics model accounts for the role of surface roughness in determining the mean interfacial gap at each discretized radial location along the sealing interface. An averaged Reynolds equation derived from mixed lubrication theory is applied to approximate the leakage flow across the rough, annular interface. The composite model is applied as a predictive tool for assessing how certain physical parameters (i.e., seal material composition, compressive applied stress, surface finish, and elastic thermo physical properties) affect seal leakage rates. Experimental results are compared with model predictions.

### 181. Chiral Analyses Using Molecular Micelles

*Presenter: Alicia A. Williams, 2002 Scholar, Louisiana State University (LSU)*

*Contributors: Sayo O. Fakayode, Onur Alpturk, Christina M. Jones, and Isiah M. Warner, Louisiana State University (LSU)*

The optimization of separation parameters in chromatography for better separation and resolution of analytes continues to be a labor intensive procedure usually performed by a trial and error method. A multivariate analysis in the form of multilinear regression (MLR) is used to optimize separation parameters and predict the migration behavior, resolution and resolution per unit time of achiral and chiral compounds in micellar electrokinetic chromatography (MEKC). Separations were performed using an achiral (poly(sodium N-undecylenic sulfate)) molecular micelle and chiral (poly(sodium N-undecanoyl-L-leucylvalinate) or poly(sodium N-undecanoyl-L-iso-leucylvalinate)) molecular micelle, respectively, at various operating temperatures, applied voltages, pH values, and molecular micelle concentrations in the background electrolyte. The separation parameters were subsequently used as input variables for MLR models. The root-mean-square percent relative error (RMS%RE) is used as a figure of merit for characterizing the performance of the migration time, resolution and resolution per unit time models. The predicted migration times, resolutions, and resolution per unit times of the chiral as well as the achiral analytes compare favorably with the experimental migration times and resolutions, indicating the versatility and wide applicability of the technique in MEKC.

In addition, novel fluorescent chiral molecular micelles (FCMMs) were synthesized, characterized, and employed as chiral selectors for non-fluorescent chiral molecules using steady state fluorescence spectroscopy. The sensitivity of the fluorescence technique allowed for the investigation of low concentrations of chiral selector ( $3.0 \times 10^{-5}$  M) and analyte ( $5.0 \times 10^{-6}$  M) to be used in these studies. The chiral interactions of glucose, tartaric acid, and serine in the presence of FCMMs poly(sodium N-undecanoyl-L-tryptophanate) [poly-L-SUW], poly(sodium N-undecanoyl-L-tyrosinate) [poly-L-SUY], and poly(sodium N-undecanoyl-L-phenylalaninate) [poly-L-SUF] were based on diastereomeric complex formation or hydrophobic interactions. Poly-L-SUW had a significant fluorescence emission spectral difference as compared to poly-L-SUY and poly-L-SUF for the enantiomeric recognition of glucose, tartaric acid, and serine. Studies with the hydrophobic molecule  $\alpha$ -pinene suggested that poly-L-SUY and poly-L-SUF had better chiral discrimination ability for hydrophobic analytes rather than hydrophilic analytes. Partial-least-squares regression modeling (PLS-1) was used to correlate changes in the fluorescence emission spectra of poly-L-SUW due to varying enantiomeric compositions of glucose, tartaric acid, or serine for a set of calibration samples. Validation of the calibration regression models was determined from a set of independently prepared samples of the same concentration of chiral selector and analyte with varying enantiomeric composition. Prediction ability was evaluated by use of the root-mean-square percent relative error (RMS%RE) and ranged from 2.04% to 4.06%. The D-enantiomer of each analyte pair was found to have slightly lower RMS%RE values than the L form. This observation is likely the result of a stronger diastereomeric complex formed between the D-enantiomer and poly-L-SUW.

# Abstracts

## Session 2

Saturday, October 6, 2007 (3:00 pm –4:30 pm)

Wilson Room

### 182. Process, Preference, and Performance: The Role of Ethnicity and Socioeconomic Status in Computer Interface Metaphor Design

Presenter: Kayenda T. Johnson, 1999 Scholar, Virginia Tech

This research addresses a problem that centers on the apparent disparities that persist in computer use/access among racial minorities and individuals of lower economic status here in the U.S. One intervention, from a Human Factors perspective, is in recognizing and accounting for culture's influence on one's cognition. Consequently, this research was designed to address this matter as both a "process" and "product" problem. One goal of this research endeavor is to develop a culturally valid interface design methodology that can be later used to identify and develop appropriate computer interface metaphors for groups that are typically marginalized in the design process. An accompanying research goal is to determine a set of computer interface metaphors that are effective for economically underserved ethnic minorities. Subsequent statistical analyses will provide insight into any differences in performance when African-Americans of low socioeconomic status are tested on a computer interface developed using an interface metaphor suggested by a cohort African-American group versus Microsoft Word 2003 (which uses the more standard "Office" metaphor). In addition, regression analyses will be used to determine if there is a substantial relationship between spatial ability, general self-efficacy, computer attitudes, and user performance among this economically underserved ethnic minority group when tested on a given computer interface design.

### 183. A Novel Statistical Approach Identifying and Limiting the Effect of Influential Observations in Linear Regression

Presenter: Tamekia Jones, 2000 Scholar, University of Alabama

Diagnostic issues such as outliers, leverage points, influential observations, and the masking effect are often encountered in linear regression when analyzing data using ordinary least squares. To properly detect and manage these diagnostic issues, robust regression methods are recommended. We present a robust forward detection (RFD) method within the framework of linear regression based on the concept of the minimum covariance determinant, robust distances, and nearest neighbor multiple testing. We further implement functions that allow atypical observations (outliers, leverage points, influential observations) identified by the RFD method to be weighted unequally, unlike OLS. Consistency and accuracy of the proposed methods are evaluated via simulations. In addition, examples are presented to further illustrate the robustness of the RFD method towards diagnostic issues and its ability to limit the effect of influential observations via weight functions.

### 184 . Endogenous Lipid Presentation, CD1 Expression, and CD1-Restricted T Cells During HIV-1 Infection

Presenter: Halonna Kelly, 2001 Scholar, New York University School of Medicine

Contributor: Moriya Tsuji, Aaron Diamond AIDS Research Center, The Rockefeller University, Department of Medical Parasitology, New York University School of Medicine

One reason behind the lack of viral clearance in HIV infection involves the ability of HIV to downregulate major histocompatibility complex (MHC)-I molecules, thereby evading the CTL immune response. CD1 molecules are MHC-like proteins that present lipids to CD1-restricted T cells. We assessed endogenous lipid presentation and CD1 modulation during HIV infection and found that while CD1c and CD1d were downregulated, the level of modulation did not reach that of MHC I. Our data suggest that this is due to the concomitant HIV-induced production of host cholesterol, which functions to maintain CD1 expression on the cell surface. Blockage of cholesterol production in infected cells decreased CD1 expression by more than 10%, further supporting the role of cholesterol production in maintaining CD1 levels. While cells producing increased amounts of cholesterol had an enhanced capacity to induce interferon (IFN)-gamma secretion in CD1-restricted T cells, HIV-infected cells, despite having been induced by the virus to produce cholesterol, had a decreased capacity to activate these same cells, suggesting that the moderate downregulation of CD1s during HIV infection is enough to diminish the lipid-mediated anti-HIV response. Together, these data suggest that during HIV infection, a tug-of-war occurs, where HIV downregulates CD1 molecules as a means to evade the host immune response, but at the same time induces the production of cholesterol, for which synthesis plays a role in maintaining CD1 expression on the cell surface.

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Mamudua Yakubu  
Winston-Salem University  
Chemistry

Lei Zhang  
Winston-Salem University  
Chemistry



Okon Akpan  
Bowie State University  
Computer Science

Marjay Anderson  
Howard University  
Comprehensive Sciences

Jahangir Ansari  
Virginia State University  
Engineering and Technology

Jonathan Bagger  
Johns Hopkins University  
Physics and Astronomy

Christine Barrow  
Prince George's Community College  
Biological Science

Mark Barsoum  
J.C. Smith University  
Natural Sciences and Mathematics

Barry Berman  
GW University  
Physics

Constance Bland  
MS Valley St. University  
Mathematics, Computer and Information  
Sciences

Adelia Bovell-Benjamin  
Tuskegee University  
Food and Nutritional Science

Mimi Bres  
Prince George's Community College  
Biological Science

Sabrina Broughen  
Delaware State University  
Biology Department

Constance Brown  
Indiana University  
Geography Department

Linda Burruss  
Drake State Technical  
Mathematics and Science

Jian Cao  
Northwestern University  
Mechanical Engineering

Dylan Conger  
GW University  
Public Policy and Public Administration

Bonita Cooper  
Howard University  
Comprehensive Sciences

Kellina Craig-Henderson  
NSF  
SBE/BCS Social Psychology Program

David Daleke  
Indiana University  
Medical Sciences

Rosalie Dance  
University Virgin Island  
Mathematics

Kamla Deonauth  
Howard University  
Biology

Marcelin Diagne  
Towson University  
Economics

Patrice Dickerson  
Ohio State University  
Social and Behavioral Sciences

Juan Dominguez  
American University  
Psychology

Robert Donaldson  
GW University  
Biology

Alfreda Dudley-Sponaule  
Townson University  
Computer and Information Sciences

Renata Dusenbury  
Saint Augustine's College  
Forensic Science

Michael Edwards  
Indiana University  
Chemistry

Abe Eftekhari  
Southeastern University  
Computer Science

George Eng  
University of the District of Columbia  
Chemistry and Physics

Jerry Feldman  
GW University  
Physics

Iesha Fields  
Howard University  
Comprehensive Sciences

Solomon Gebru  
Howard University  
Comprehensive Sciences

Peter Gichuhi  
Tuskegee University

Roxanna Harlem  
McDaniel College  
Sociology

Jill Harp  
Winston-Salem State  
Life Sciences

Thomas Heinbockel  
Howard University  
Anatomy

Anil Jain  
Howard University  
Comprehensive Sciences

# Judges

Giti Javidi  
Virginia State University  
Mathematics and Computer Science

Tabmitha Jervey  
Norfolk State University  
Biology

Mohammed Karim  
Alabama A&M University  
Mathematics

Dongryul Kim  
Saint Augustine's College  
History and Political Science

Rhonda Kuykindoll  
LeMoyne-Owen College  
Biology

Elizabeth Lawrence  
National Science Foundation  
Biological Sciences Directorate

Mulatu Lemma  
Savannah State University  
Natural Sciences and Mathematics

Anthea Letsou  
University of Utah  
Molecular Biology

Eugene Mananga  
Graduate Center of CUNY  
OEODP

Andre Marshall  
University of Maryland Baltimore County  
Fire Protection Engineering & Aerospace  
Engineering  
University of Maryland

Jermey Matthews  
Howard University  
Civil Engineering

Tamra Mendelson  
University of Maryland Baltimore County  
Biological Sciences

Akbar Montaser  
GW University  
Chemistry

Bhamini Nayar  
Morgan State University  
Mathematics

Asamoah Nkwanta  
Morgan State University  
Mathematics

Hyounkyun Oh  
Savannah State University  
Natural Sciences and Mathematics

Moses Olobatuyi  
Morgan State University  
Sociology and Anthropology

Joe Omojola  
Southern University at New Orleans  
Natural Sciences  
6801 Press Drive

Allena Opper  
GW University  
Physics

Gloria Payne  
Saint Augustine's College  
Office of Research and Sponsored  
Programs

Sandra Petersen  
University of Mass Amherst  
Biology

Flynn Picardal  
Indiana University  
Public and Environmental Affairs

Atma Sahu  
Coppin State University  
Mathematics and Computer Science

Maureen Scott  
Norfolk State  
Biology

Barbara Sears  
Michigan State University  
Genetics Graduate Program  
Lian Shen

Johns Hopkins University  
Civil Engineering

Vonnie Shields  
Towson University  
Biological Sciences

Jean Shin  
American Sociological Association  
Minority Affairs Program (Director)

Dr. Bernard Singleton  
Bowie State University  
Biology

Teresa Singleton  
Winston-Salem State  
Life Sciences

Beate Sissenich  
Indiana University  
Political Science

Xueqing Song  
University of the District Of Columbia  
Chemistry and Physics

Subramania Sritharan  
Central State University  
International Center for Water Resources  
Management

Munir Sulaiman  
Norfolk State University  
Technology

Ahlam Tannouri  
Morgan State University  
Mathematics

Guebre Tessema  
National Science Foundation  
Chemistry

Nitish Thakor  
Johns Hopkins University

Uma Venkateswaran  
National Science Foundation  
Division of Materials Research

Claire Vieille  
Michigan State University  
Biochemistry and Molecular Biology

Nina Walker  
Spelman College  
Office of Science, Engineering and  
Technical Careers (OSETC)

George C. Washington  
Jackson State University  
Biology

Mark Whigham  
Lawson State Community College  
Business and Information Technology

Chavon Renee Wilkerson  
National Science Foundation  
Division of Chemistry

Jane Wolfson  
Townson University  
Environmental Science

Terrance Worchesky  
UMBC  
Physics

Matthew Yeazeal  
Anne Arundel Community College

Vesna Zderic  
GW University

Lez Zhang  
Winston-Salem State  
Chemistry

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Robotics  
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Phone: 202-334-2872 or

E-mail: [infofell@nas.edu](mailto:infofell@nas.edu)

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### Arkansas State University Graduate Program in Environmental Sciences

PO Box 847  
State University, AR 72467  
Phone: 870-972-2007  
<http://evs.astate.edu>

Contact: Robyn Hannigan  
HANNIGAN@astate.edu

#### Booth #25

The mission of the Graduate Program in Environmental Science (EVS) is to bring a diverse research, teaching, and outreach capacity to bear on environmental problems from local to global scales. The biological, physical, and social scientists in the program represent a broad range of disciplinary expertise, while working within the unifying framework of the analysis of environmental problems and developing management strategies to address them. The study of the environment demands a holistic understanding of social, physical, and biological systems and the transfer of basic research findings through practical implementation, teaching, and outreach. EVS facilitates the cross-disciplinary collaboration necessary to address vital, contemporary issues.

EVS embraces both disciplinary and cultural diversity providing uniquely enriching individualized programs of study drawing on the range of expertise of our associated faculty. Our opportunity is to provide a well-rounded graduate education program that develops professionals with the ability to successfully address dynamic problems, while simultaneously allowing for in-depth, specialized research at the forefront of selected fields of endeavor.

---

### Association of American Veterinary Medical Colleges

1105 Vermont Avenue, NW  
Suite 301  
Washington, DC 20005  
[www.aavmc.org](http://www.aavmc.org)

Contact: Lawrence Heider  
lgreenhill@aavmc.org

#### Booth #59

The Association of American Veterinary Colleges coordinates the national and international affairs of all 32 veterinary medical colleges in the United States and Canada, nine departments of veterinary science, eight departments of comparative medicine, two animal medical centers, and four international colleges of veterinary medicine. We foster the teaching, research, and service missions of our members, both nationally and internationally. Our mission is to improve the quality of life for people and animals by advancing veterinary medical education, improving animal health and welfare, strengthening biomedical research, promoting food safety and food security, and enhancing environmental quality.

---

### Boston College— Graduate School of Arts and Sciences

140 Commonwealth Avenue  
Chestnut Hill, MA 02467  
Phone: 617-552-3265  
<http://gsas.bc.edu>

Contact: Robert Howe  
hower@bc.edu

#### Booth #52

Founded in the early 1920s, the Graduate School of Arts and Sciences at Boston College (BC) is the oldest of BC's seven graduate and professional schools.

Comprised of 17 departments, the Graduate School offers doctoral and master's degrees in the humanities and in social and natural sciences. The faculty determines admission standards and establishes the requirements for the various degree programs.

The Graduate School also offers several dual-degree options in cooperation with the following: The Carroll School of Management; the Boston College Law School; the Lynch School of Education; and the Graduate School of Social Work.

---

### California Institute of Technology

1200 E. California Boulevard  
Pasadena, CA 91125  
Phone: 626-395-6811  
<http://www.caltech.edu>

Contact: Natalie Gilmore  
gradofc@caltech.edu

#### Booth #46

The mission of the California Institute of Technology is to expand human knowledge and benefit society through research integrated with education. We investigate the most challenging, fundamental problems in science and technology in a singularly collegial, interdisciplinary atmosphere, while educating outstanding students to become creative members of society.

---

### Center for Compact and Efficient Fluid Power University of Minnesota

111 Church Street SE  
Minneapolis, MN 55455  
Phone: 612-624-4991  
Fax: 612-626-7165

Contact: Alylssa A. Burger  
aburger@me.umn.edu

#### Booth #48

The Center for Compact and Efficient Fluid Power (CCEFP) is a collaboration of seven academic institutions (University of Minnesota, UIUC, GA Tech,

# Exhibitors

Purdue, Vanderbilt, MSOE, North Carolina A&T). Our vision is to create new fluid power (fp) technology that is compact and efficient. Our goal is to train leaders in advanced fp technology and research; ensure all undergraduate mechanical engineering students are exposed to basic concepts of fp; increase opportunities for students to gain hands-on knowledge of fp principles and applications through improved laboratory experiences and industrial internships; provide increased education opportunities for underrepresented engineering students; and increase public and K-12 student awareness of the importance of fp.

---

## Cleveland Clinic, Lerner College of Medicine

9500 Euclid Avenue, NA21  
Cleveland, OH 44195  
Phone: 866-735-1912 or 216-445-5770  
Fax: 216-636-3206  
cclcm@ccf.org

Contact: Elizabeth Myers, MEd  
Director of Admissions and Financial Aid of the Cleveland Clinic,  
Lerner College of Medicine  
myerse@ccf.org  
216-445-7170

Booth #38

The College Program is a distinct curriculum offered by the Cleveland Clinic, Lerner College of Medicine, in collaboration with Case Western Reserve University School of Medicine. The goal of the College Program is to train physician investigators, and the curriculum is designed to foster a passion for scientific inquiry, skills for critical thinking, and clinical expertise. This is the only program in the country that combines an integrated didactic and experiential research curriculum that extends throughout the five years of medical school with a required master's level thesis based on hypothesis-driven clinical or basic research. Students graduate with an "MD with Special Qualifications in Biomedical Research." The basic science curriculum provides a graduate education approach, with interactive seminars, problem-based learning sessions, and laboratories aimed at developing in-depth problem-solving skills. The small class of 32 students facilitates individual attention and curricular flexibility to meet the academic needs of College students. The ideal applicant will have some prior research experience and the ability to learn in self-directed small group settings.

---

## Cornell University Graduate School

350 Caldwell Hall  
Ithaca, NY 14863  
Phone: 607-255-7374  
<http://www.gradschool.cornell.edu/>

Contact: Terry Plater, Associate Dean of Academic Affairs  
grad\_assoc\_dean@cornell.edu

Booth #13

With 94 major fields and 16 minor fields of study, and with 15 different graduate degrees awarded, graduate study at Cornell defies easy categorization. But despite our enormously diverse academic offerings, a few common practices unify the graduate school experience. First, our faculty members are truly available to our students. Second, graduate research at Cornell, regardless of field, is bound by a common philosophy of academic freedom and flexibility. Cornell is especially well suited to those with cross-disciplinary interests. Such academic freedom, however, comes with the responsibility to think independently, act responsibly, and pursue one's research with self-directed passion.

---

## CUNY Graduate Center

365 Fifth Ave  
New York, NY 10016  
[www.gc.cuny.edu](http://www.gc.cuny.edu)

Contact: M. Chantale Damas, PhD  
AGEP Program Manager  
Room 8306  
CUNY Graduate Center  
New York, NY 10016  
Phone: 212-817-7545  
Fax: 212-817-1630

Lorraine Towns  
212-817-7540  
oeodpmail@gc.cuny.edu

Booth #12

The Graduate Center is the doctorate-granting institution of the City University of New York (CUNY). An internationally recognized center for advanced studies and a national model for public doctoral education, the school offers more than 30 doctoral programs and a number of master's programs. Further information on the Graduate Center and its programs can be found at [www.gc.cuny.edu](http://www.gc.cuny.edu). The Office of Educational Opportunity and Diversity Programs (OEODP) offers financial, social, and academic support under its MAGNET (Minority Access/Graduate Networking), Alliance for Graduate Education and the Professoriate (AGEP), and Bridges to the Doctorate programs. Further information on its activities and fellowship applications can be found at <http://web.gc.cuny.edu/oeodp>.



---

**Delaware State University**

1200 North Dupont Highway  
Dover, DE 19901  
<http://www.desu.edu>  
302-857-6060

Contact: Dr. Mazen Shahin  
Professor of Mathematics  
Director, HBCU-UP Project  
[mshahin@desu.edu](mailto:mshahin@desu.edu)  
302-857-7055

**Booth #40****Seeds of Success: The HBCU-UP Program at Delaware State University**

Delaware State University's HBCU-UP project provides academic support and enrichment for students majoring in science, technology, engineering, and mathematics (STEM) disciplines. Programs and resources supported by the project include: 1) a summer bridge program for incoming STEM freshmen designed to improve their mathematics skills and ease their transition to college life; 2) a peer tutoring program providing tutoring for gatekeeper courses in STEM areas; 3) summer and academic year undergraduate research programs in which students work one-on-one with a faculty research mentor; 4) a living-learning community that brings STEM freshman together on one floor of a dorm; 5) curriculum development and technology infusion programs that provide support for faculty to upgrade STEM courses; 6) a science seminar series that brings in scientists doing cutting-edge research to talk about their careers and their research; and 6) a Science Resource Center in the library with a state-of-the-art computer lab and study rooms for students.

---

**Emory University/MD/PhD Program and Graduate Division of Biological and Biomedical Sciences**

1462 Clifton Road, Suite 314  
Atlanta, GA 30322  
Phone: 404-727-2547

Contacts: Kathy Smith  
[kathy.smith@emory.edu](mailto:kathy.smith@emory.edu)  
M. Horton  
[mhorton@emory.edu](mailto:mhorton@emory.edu)

**Booth #47**

The Division of Biological and Biomedical Sciences has eight interdisciplinary PhD Programs: Biochemistry, Cell and Developmental Biology, Genetics and Molecular Biology, Immunology and Molecular Pathogenesis, Microbiology and Molecular Genetics, Molecular and Systems Pharmacology, Neuroscience Nutrition and Health Sciences, Population Biology, and Ecology and Evolution

The MD/PhD Program is a National Institutes of Health-funded Medical Scientist Training Program providing both clinical and basic research training to pursue careers in academic medicine. The Program offers graduate training in a broad array of disciplines including the physical and life sciences, engineering, and public health and social sciences.

---

**EPA/NCER**

Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460

Contact: [willett.stephanie@epa.gov](mailto:willett.stephanie@epa.gov) (Graduate Fellowships)  
[boddie.georgette@epa.gov](mailto:boddie.georgette@epa.gov) (Undergraduate)

**Booth #54**

The Environmental Protection Agency is continuing to offer undergraduate and graduate fellowships to students in environmentally related fields of study. Students conducting research in the physical and biological sciences, as well as the social sciences and engineering, are eligible to apply for these fellowships beginning in August of 2007. Minority applicants are especially encouraged to apply, since the number of minority applicants has historically been low. The application period for STAR and GRO Graduate closes October 2007. The application period for the GRO Undergraduate closes November 2007. Awards will be determined in May of 2008 for the 2008–2009 academic year.

---

**Florida A&M University—NOAA Environmental Cooperative Sciences Center**

1515 South Martin Luther King Boulevard  
Science Research Center, Room 307  
Tallahassee, FL 32307  
Phone: 850-412-7797  
Fax: 850-412-7839

Contact: Michelle S. Williams, MPH  
Program Manager  
NOAA Environmental Cooperative Science Center  
[michelle.williams@fam.edu](mailto:michelle.williams@fam.edu)

**Booth #22**

The National Oceanic and Atmospheric Administration (NOAA) Environmental Cooperative Science Center (ECSC) is led by Florida A&M University in collaboration with seven partnering institutions. One of the primary goals of the ECSC is to increase the number of scientists, particularly from underrepresented minority groups in the environmental, coastal, and oceanic sciences. The ECSC has an undergraduate fellows program and a graduate fellows program. Graduate fellows will be recruited into specific degree programs from ECSC institutions and other institutions that have quality environmental science and policy programs.

# Exhibitors

---

## Howard Hughes Medical Institute Janelia Farm Research Campus and HHMI Grants & Special Programs

19700 Helix Dr  
Ashburn, VA 20147  
Office of Science & Training  
Phone: 571-209-4358  
Fax: 571-209-4060  
<http://www.hhmi.org/janelia/>

Contact: Lauren Thompson, MS  
Program Specialist  
thompsonl@janelia.hhmi.org

### Booth #28

The Howard Hughes Medical Institute (HHMI)/Janelia Farm Research Campus opened in 2006 and focuses on the study of neural circuits and the development of synergistic imaging technologies. Janelia also runs a conference program, a joint graduate program (with the Universities of Chicago and Cambridge), and a summer undergraduate program. For more information, see <http://www.hhmi.org/janelia>.

HHMI's individual graduate programs support graduate students, medical students, and physician-scientists. The HHMI-NIBIB interfaces Initiative supports interdisciplinary graduate research training at the interface of biomedical and physical sciences. The Med into Grad Initiative integrates medical knowledge into graduate education, training PhD scientists to work at the basic science/clinical medicine interface.

---

## Howard University Graduate School

400 College Street, NW  
Washington, DC 20059  
Phone: 202-806-7469

Contact: Winnifred Watson-Florence  
wwatson-florence@howard.edu

### Booth #43

Founded in 1867, Howard University is an institution of global reputation and influence, with students from approximately 100 nations and nearly every continent. The Howard University Graduate School is uniquely appropriate for graduate study. Widely ranging disciplines cover scientific and humanistic discovery in most major areas of study. Many disciplines emphasize issues and problems that disproportionately affect people of color, particularly African-Americans, as well as issues of global impact. A total of 28 PhD programs, 30 master's programs, and 9 MD/PhD programs are located in four divisions: the arts and the humanities, the biological and life sciences, the engineering and physical sciences, and the social sciences.

---

## Indiana University - Midwest Crossroads AGEP

130 S. Woodlawn Avenue  
Kirkwood Hall 111  
Bloomington, IN 47405  
Phone: 812-855-5697  
Fax: 812-855-4266

Contacts: Dr. Yolanda Trevino, Erika Lee, and  
Ana Maria Velasco  
amvelasc@indiana.edu

### Booth #11

The primary goal of the Midwest Crossroads Alliance for Graduate Education and the Professoriate (AGEP), which is an alliance between Purdue University West Lafayette, Indiana University Bloomington, and Northwestern University Evanston, is to triple the number of underrepresented minorities receiving doctoral degrees in STEM fields.

Midwest Crossroads AGEP schools are linked and partnered to share graduate study opportunities with promising STEM applicants. Student success is important and a team effort. Each institution also offers several student enrichment sessions promoting the academic and professional development of Midwest Crossroads AGEP students. Minority graduate student organizations on each campus offer incoming graduate students an instant peer network, AGEP faculty are committed to graduating minority PhD students, and transition programs are offered for students to acclimate to the rigors of graduate study.

---

## Indiana University School of Optometry

800 East Atwater Avenue  
Bloomington, IN 47401  
Phone: 812-855-3242  
Fax: 812-855-4389

Contact: Joseph P. Boes  
jboes@indiana.edu

### Booth #3

The Indiana University School of Optometry is located on the main campus in Bloomington. This campus with an enrollment of 38,000+ students offers a wide range of cultural activities, major athletic events, and recreational opportunities. Bloomington is located 55 miles south of Indianapolis and has a local population of 68,000. The first professional courses in optometry were offered in the fall of 1953. In the years that have followed, the Indiana University School of Optometry has received national recognition for its preeminence in optometric education. The school is housed in a six-story, limestone-faced building that was completed in 1967. This facility houses our classrooms, laboratories, clinic, library, offices, and supporting research and development centers. Additional clinical facilities are located in Indianapolis, IN; Carmel, IN; and Guanajuato, Mexico.

---

**Indiana University, Bloomington—Biology Department**

1001 E. Third Street  
 Bloomington, IN 47405  
 Undergraduate Office: 812-855-3810  
 Graduate Office: 812-856-5522  
[www.bio.indiana.edu](http://www.bio.indiana.edu)

Contact: Tracey Stohr  
[tstohr@indiana.edu](mailto:tstohr@indiana.edu)  
 Phone: 812-856-6303  
 Fax: 812-855-6705

**Booth #60**

The Indiana University (IU) Department of Biology offers graduate programs in Molecular Biology and Genetics (PhD); Microbiology (MS or PhD); Ecology, Evolution, and Behavior (PhD), and Plant Biology (MS or PhD). Doctoral candidates receive full support in the form of fellowships or assistance-ships. The IU Biology Department has one of the largest rosters of faculty biologists in the nation and is recognized for exceptional research. In fall 2007, a new \$57 million dollar interdisciplinary science building will open. Fall 2008 admission deadline (domestic): January 5, 2008; (international): December 1, 2007. Ask about our application fee waivers (certain criteria must be met).

---

**Iowa State University**

1137 Pearson Hall  
 Ames, IA 50011  
[www.grad-college.iastate.edu](http://www.grad-college.iastate.edu)

Contact: Thelma L. Harding  
[tlhardi@iastate.edu](mailto:tlhardi@iastate.edu)  
 Phone: 515-294-2868  
 Fax: 515-294-3003

**Booth #5**

Iowa State University of Science and Technology offers graduate programs in over 100 fields of study that routinely cross the boundaries of traditional disciplines. Graduate study at Iowa State gives you the best of both worlds: one-on-one mentoring that focuses on your needs and aspirations, together with all the resources of one of the world's most respected research institutions. Along with your major professor and study committee, you'll collaborate with faculty members who are leaders in their fields. Whether in seminars, research labs, studios, or internships, you'll learn in small dynamic groups of peers and faculty.

---

**John Hopkins University, Department of Cognitive Science**

3400 N. Charles Street  
 Krieger Hall, Room 237  
 Baltimore, MD 21218  
 Phone: 410-516-6844

Contact: Patricia Creswell  
[creswell@cogsci.jhu.edu](mailto:creswell@cogsci.jhu.edu)

**Booth #36**

The Cognitive Science department at Johns Hopkins University provides theoretically oriented research and training opportunities for undergraduates, graduate students, and postdoctoral fellows. As a fully autonomous academic unit, we provide a focused environment that is dedicated to the multidisciplinary intellectual challenge of integrating contemporary approaches to the study of the mind/brain.

With the support of the National Science Foundation (NSF)-funded IGERT training grant, students are awarded a support package consisting of a yearly stipend, tuition waiver, and health benefits every year for 5 years. Members of underrepresented groups in science and engineering are especially encouraged to apply.

---

**John Hopkins University (IGERT)  
Johns Hopkins University, Institute for  
NanoBioTechnology (INBT)**

3400 N. Charles Street  
 Baltimore, MD 21218  
 Phone: 410-516-6572  
<http://inbt.jhu.edu/index.php>

Contact: Ashanti Edwards  
[aedwards@jhu.edu](mailto:aedwards@jhu.edu)  
 Web: <http://inbt.jhu.edu/index.php>

**Booth #39****Undergraduate Program:**

The INBT REU program provides undergraduate students with challenging research experiences in the growing area of nanobiotechnology, at the interface of nanotechnology and biology and medicine. Upon completing the program, REU students will have a greater understanding of the applications of nanotechnology for biology and medicine.

**Graduate Programs:**

IGERT—Trains students in biology, engineering, and materials synthesis to create probes to study biological events.

HHMI/NBMed—Trains engineers and scientists to become adept at the manipulation of the cell/nanotech interface from the physical, materials, and biological perspectives.

# Exhibitors

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## Medical University of South Carolina

173 Ashley Avenue, BSB102  
PO Box 250501  
Charleston, SC 29425  
<http://www.musc.edu>  
Phone: 843-792-2300

Contact: Cynthia Wright  
[wrightcf@musc.edu](mailto:wrightcf@musc.edu)

### Booth #57

As a freestanding academic health center, the Medical University of South Carolina (MUSC) has a special mission to translate advances in fundamental science to improvements in health care. The College of Graduate Studies at MUSC offers MS, PhD, MD/PhD, DMD/PhD, and PharmD/PhD programs in the biomedical sciences. Located in scenic Charleston, SC, we offer a competitive stipend (\$22,000–\$24,000 /year), paid health insurance, and paid tuition for PhD students. We also have a robust Summer Undergraduate Research Program that provides funding for undergraduates to obtain research experience. The College of Graduate Studies has an interdisciplinary first-year curriculum composed of coursework, laboratory rotations, and special topics seminars.

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## Michigan State University The Graduate School

110 Linton Hall  
East Lansing, MI 48824  
Phone: 517-353-3220  
Fax: 517-353-3355  
<http://www.msu.edu/user/gradschl/>

Contact: Shobha Ramanand, Ph.D.  
AGEP Program Manager  
The Graduate School  
email: [ramanand@msu.edu](mailto:ramanand@msu.edu)  
Roseann Marsh

### Booth #32

Michigan State University (MSU) located in East Lansing, MI, the nation's first land-grant university founded in 1855, has been advancing knowledge and transforming lives through its innovative teaching, research, and outreach and engagement. Its 17 degree-granting colleges include three medical schools, an affiliated law college that offer eighty-nine (89) doctoral programs, one hundred-ten (110) masters programs, and three (3) graduate-professional programs that include internationally known basic science, plant science and engineering departments. The University is committed to graduating educated men and women with diverse backgrounds who are active learners. To learn more about MSU's graduate programs, please visit the website of MSU's Graduate School: <http://grad.msu.edu>.

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## Nano/Bio Interface Center University of Pennsylvania

3231 Walnut Street  
Philadelphia, PA 19304  
Phone: 215-898-5151  
Fax: 215-746-3204  
[www.nanotech.upenn.edu](http://www.nanotech.upenn.edu)

Contact: James V. McGonigle, Jr.  
Programs Coordinator  
Nano/Bio Interface Center  
[jmcgon@seas.upenn.edu](mailto:jmcgon@seas.upenn.edu)

### Booth #7

The Nano/Bio Interface Center at the University of Pennsylvania in Philadelphia offers a variety of opportunities for undergraduate student research as well as graduate studies in all STEM areas. The Undergraduate Research at the Nano/Bio Interface program provides research experience at the cutting edge of the nanotechnology and nanoscale science. This 10-week program offers a \$4,000 stipend. Likewise, there are numerous opportunities for graduate studies leading to advanced degrees in engineering, medicine, and arts and sciences. One example is the Drexel-Penn IGERT Fellowship in Nanotechnology. This interdisciplinary PhD program offers the resources of two universities on essentially one campus.

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## National College of Natural Medicine

049 SW Porter Street  
Portland, OR 97201  
[admission@ncnm.edu](mailto:admission@ncnm.edu)

Contact: Marie Cassell

### Booth #49

Located in Portland, OR, the National College of Natural Medicine (NCNM) (the country's oldest accredited naturopathic medical school) has been an educational leader in natural medicine for over 50 years, offering two post-baccalaureate degrees: Doctor of Naturopathic Medicine (ND), a four-year program of clinical sciences and holistic methods of healing and disease prevention; and a Master of Science in Oriental Medicine (MSOM), a four-year program delving deep into thousands of years of classical Chinese methods of diagnostics and healing.

NCNM provides a challenging, eclectic, and rigorous curriculum, focusing on the forefront of natural medicine, integrated medical education, research, and patient care.

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### National Institute for Allergy and Infectious Diseases (NIAID)

6610 Rockledge Drive  
Bethesda, MD 20892  
Phone: 301-592-2189  
<http://www3.niaid.nih.gov>

Contact: Kerry Smith  
[ksmith@air.org](mailto:ksmith@air.org)

#### Booth #10

The National Institute of Allergy and Infectious Diseases (NIAID) conducts and supports basic and applied research to better understand, treat, and ultimately prevent infectious, immunologic, and allergic diseases. For more than 50 years, NIAID research has led to new therapies, vaccines, diagnostic tests, and other technologies that have improved the health of millions of people in the United States and around the world.

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### National Institute of Mental Health

9000 Rockville Pike, Bldg. 10  
Bethesda, MD 20892

Contacts: Margarita Valencia and Laura Ortiz  
[estradak@mail.nih.gov](mailto:estradak@mail.nih.gov)

#### Booth #53

Located on the National Institutes of Health campus in Bethesda, MD, the National Institute of Mental Health (NIMH) plans and conducts basic, clinical, and translational research to advance understanding of the diagnosis, causes, treatment, and prevention of mental disorders through the study of brain function and behavior. By conducting state-of-the-art research, NIMH provides an environment conducive to the training and development of clinical and basic scientists.

In addition to individualized trainee/mentor-driven postdoctoral training opportunities in the clinical and basic sciences, the NIMH offers Post-baccalaureate Research Training Awards, a Clinical Electives Program, as well as a variety of Summer Research Fellowships and an Undergraduate Internship Program.

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### National Research Council of the National Academies Fellowship Programs

500 5th Street NW, Keck 568  
Washington, DC 20001  
Phone: 202-334-2760  
[rap@nas.edu](mailto:rap@nas.edu)

Contact: Ms. Danna Winstead

#### Booth #14

The National Research Council of the National Academies offers Ford Foundation Diversity Fellowships for research-based study in the sciences and humanities. Fellowships are offered at the predoctoral, dissertation, and

postdoctoral levels. Qualified applicants must be U.S. citizens who are committed to a career in teaching at the college or university level. These Fellowships are portable and provide a generous stipend as well as an institution allowance for predoctoral and postdoctoral fellows. Complete information, including instructions on how to apply online, is available at <http://national-academies.org/fellowships>. Questions can be directed to 202-334-2872 or [infocell@nas.edu](mailto:infocell@nas.edu).

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### NC State The Graduate School

1575 Varsity Drive  
Flex Lab, Module 6  
Campus Box 7102  
Raleigh, NC 27695-7102  
[http://www.fis.ncsu.edu/grad\\_fellows/AGEP/sum\\_pro.htm](http://www.fis.ncsu.edu/grad_fellows/AGEP/sum_pro.htm)

Contact: Ms. Alison Al-Baati  
NC State AGEP Assistant Director  
Coordinator of Professional Development  
Phone: 919-513-0005  
Fax: 919-515-2873  
[alison\\_albaati@ncsu.edu](mailto:alison_albaati@ncsu.edu)

#### Booth #24

The Alliance for Graduate Education and the Professoriate (AGEP) Summer Research Experience (SRE) is designed for outstanding undergraduates who are considering a PhD. Funded by the National Science Foundation, the AGEP-SRE is part of a comprehensive program that is intended to diversify the professoriate in science, technology, engineering, and mathematics.

The AGEP program is typically from the beginning of June through the beginning of August each year. During this period, undergraduate student researchers conduct research with a designated world-class faculty mentor for 40 hours per week, attend weekly Graduate School Professional Development workshops and seminars, participate in a GRE Preparation Course, build important partnerships and gain networking experience, and present research in the annual NC State Undergraduate Summer Research Symposium.

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### The News Hour with Jim Lehrer

Contacts: Lea Winerman  
Associate Web Editor - Science  
Online NewsHour with Jim Lehrer  
Phone: 703-998-2117  
[lwinerman@newshour.org](mailto:lwinerman@newshour.org)

Larisa Epatko  
News Editor  
Online NewsHour with Jim Lehrer  
Phone: 703-998-1842  
[lepatko@newshour.org](mailto:lepatko@newshour.org)

The NewsHour with Jim Lehrer on PBS provides thoughtful, objective and in-depth coverage of national and world events. A grant from the National Science Foundation has enabled the NewsHour to cover scientific research -- issues such as stem cells, climate change and space exploration -- with that same depth and clarity.

# Exhibitors

Come by the NewsHour booth to pick up a free DVD of science broadcast reports and learn about the online resources available for educators at [www.pbs.org/newshour/science](http://www.pbs.org/newshour/science). The Web site includes audio, video, interactive graphics, scientist Q&As, lesson plans and classroom activities -- all for free.

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## Office of Graduate Studies University of California, San Diego

9500 Gilman Drive, #0003  
La Tolla, CA 92093

Contact: Christopher Murphy  
Office of Graduate Studies  
[cpmurphy@ucsd.edu](mailto:cpmurphy@ucsd.edu)  
858-822-1492

Russ Chapman  
Scripps Institution of Oceanography, Center for Marine  
Biodiversity and Conservation  
[rchapman@ucsd.edu](mailto:rchapman@ucsd.edu)  
858-822-1706

### Booth #18

#### The Office of Graduate Studies, Student Affairs Unit

(<http://gradschool.ucsd.edu>) ensures that a diverse population of students is recruited, admitted, educated, and graduated at the University of California, San Diego. Special efforts are made to ensure that students from traditionally underrepresented backgrounds are encouraged and supported in their educational goals.

To meet the challenges of marine conservation, the Center for Marine Biodiversity and Conservation (CMBC, <http://cmbc.ucsd.edu>) was established in May 2001. The goals of CMBC are Investigation, Education, Integration, Communication, and Application. CMBC facilitates highly interdisciplinary PhD and Master of Advance Studies programs at Scripps Institution of Oceanography at the University of California, San Diego.

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## Pennsylvania State University

101 Life Sciences Building  
University Park, PA 16802  
Phone: 814-865-5471  
<http://www.psu.edu>

Contact: Ann Marie Daniel  
[amd9@psu.edu](mailto:amd9@psu.edu)

### Booth #58

The Huck Institutes of the Life Sciences at the Pennsylvania State University is an umbrella unit for 11 interdisciplinary life sciences programs/options including: Bioinformatics and Genomics, Cell and Developmental Biology, Chemical Biology, Ecology, Genetics, Immunobiology, Molecular Medicine, Molecular Toxicology, Neuroscience, Physiology, and Plant Biology. These programs involve over 300 faculty and 315 graduate students.

Programs are located at both the University Park and Hershey College of Medicine campuses in central Pennsylvania.

Students can receive training and experience as college teachers, rotations in several labs, and dual faculty mentorships as well as receiving funding for their education.

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## Rensselaer Polytechnic Institute

110 8th Street  
Troy, WA 12180  
Phone: 518-276-2716  
<http://gradadmissions.rpi.edu>

Contact: Lisa Woychik  
[woychl@rpi.edu](mailto:woychl@rpi.edu)

### Booth #29

#### Graduate Studies (Architecture, Engineering, Humanities and Social Sciences, Information Technology, Management and Technology, and Science)

Rensselaer Polytechnic Institute is the nation's oldest technological research university. Located in the Capital District of New York State, Rensselaer offers a broad range of graduate programs from five schools—Engineering, Science, Lally School of Management and Technology, Architecture, and Humanities and Social Sciences. Unique programs include interdisciplinary degrees in information technology, the MFA and PhD in Electronic Arts, and extensive opportunities in biotechnology nanotechnology and energy and the environment. Students also have the opportunity to choose from a number of dual-degree options.

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## Stanford University

Building One, Main Quad  
Stanford, CA 94305  
Phone: 650-724-7437  
<http://www.stanford.edu>

Contact: [jlbrown@stanford.edu](mailto:jlbrown@stanford.edu)

### Booth #42

Located between San Francisco and San Jose in the heart of Silicon Valley, Stanford University is recognized as one of the world's leading research and teaching institutions.

The Stanford motto, "The wind of freedom blows," is an invitation to free an open inquiry in the pursuit of teaching and research. The freedom of scholarly inquiry granted to faculty and students at Stanford is our greatest privilege; using this privilege is our objective. —President John Hennessy

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**Stony Brook University—AGEP Program**

Melville Library, Suite E1340  
 Stony Brook University  
 Stony Brook, NY 11794-3387  
 Phone: 631-632-1387  
 Fax: 631-632-1837  
<http://ws.cc.stonybrook.edu/agep>

Contact: Kathryn Piazzola  
[sunyagep@notes.cc.sunysb.edu](mailto:sunyagep@notes.cc.sunysb.edu)

**Booth #50**

Stony Brook University, located 60 miles from New York City, is internationally recognized as a major research university with the finest graduate degree programs. Stony Brook's close proximity to Brookhaven National Laboratory and Cold Spring Harbor Laboratory and our collaborative partnerships make our university an ideal choice for students interested in a vast spectrum of cutting-edge science.

Stony Brook is the lead institution of the SUNY AGEP Program, an initiative funded by the NSF. We offer a wide array of services and activities for underrepresented students in science fields designed to enhance the doctoral experience.

Visit us for more information and an application fee waiver for the HBCU-UP students.

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**Systemic Research, Inc.**

150 Kerry Place, 2nd Floor  
 Norwood, MA 02062  
 Phone: 781-278-0300  
 Fax: 781-254-0707  
<http://www.systemic.com/home>

Contact: Jason J. Kim, PhD  
[jkim@systemic.com](mailto:jkim@systemic.com)  
 Linda Crasco  
[lcrasco@systemic.com](mailto:lcrasco@systemic.com)

**Booth #8**

Systemic Research, Inc., provides expertise in key indicator database management, educational program evaluation, and research on educational reform. Systemic Research recently released the Historically Black Colleges and Universities Undergraduate Program (HBCU-UP) Academic Indicator Report (AIR), 2005. The report presents overall program progress across 25 key indicators of STEM education collected and compiled from 38 HBCU-UP institutions. HBCU-UP AIR 2005 also includes a section devoted to highlighting achievements from projects at the 38 individual institutions. Systemic Research's exhibit will illustrate highlights of the program's achievements thus far, while disseminating the report.

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**The Graduate School, University of Maryland, College Park**

2122 Lee Building  
 College Park, MD 20742  
 Phone: 301-405-0376  
<http://www.gradschool.umd.edu/>

Contact: Gloria Anglon  
 Assistant Director/Office of Graduate Recruitment, Retention & Diversity  
[recruitment@gradschool.umd.edu](mailto:recruitment@gradschool.umd.edu)

**Booth #44**

One of the premier centers for graduate education and research in the United States, the University of Maryland ranks 18th nationally among public universities. It houses nearly 100 graduate degree programs enrolling 10,000 students from every state in the union and from around the globe. In 2005, the University awarded over 500 doctoral degrees and nearly 2,000 master's degrees.

The Graduate School takes the leadership role in advancing graduate education and in enhancing conditions for graduate students. It sets and implements academic policy through the Graduate Council, administering graduate fellowships, graduate travel grants, and other graduate awards.

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**The University of Alabama**

712 Capstone Drive  
 Tuscaloosa, AL 35487  
 Phone: 205-348-7007  
<http://www.ua.edu>

Contact: Jimmy Williams  
[jwilliam@bama.ua.edu](mailto:jwilliam@bama.ua.edu)

**Booth #15**

The University of Alabama is a major, comprehensive, student-centered research university founded in 1831 as Alabama's first public college. Dedicated to excellence in teaching, research, and service, we provide a creative, nurturing campus environment where our students can become the best individuals possible, learn from the best and brightest faculty, and make a positive difference in the community, the state, and the world.

# Exhibitors

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## The University of Iowa - Graduate College

Gilmore Hall, Room 205  
Iowa City, IA 52242  
319-335-2147  
<http://www.grad.uiowa.edu/gradcoll@uiowa.edu>

Contact: Minnetta Gardinier  
[m-gardinier@uiowa.edu](mailto:m-gardinier@uiowa.edu)  
Dr. David Kusner  
Dr. Michael Anderson

### Booth #1

The University of Iowa was founded in 1855 and has a long tradition of welcoming students from across all walks of life. Currently, the Graduate College plays an active role in supporting students from every Iowa county, all 50 states, two U.S. possessions, and 113 foreign countries. Students of Asian, African, Latino, Native American, and other backgrounds find many opportunities for support and cultural identification at the University. Eighty percent of our Graduate College budget is spent directly on student stipends, fellowships, and tuition scholarships. These funds support graduate students across 100+ graduate programs granting doctoral and master's degrees.

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## Tulane University

605 Boggs Hall  
New Orleans, LA 70118  
Phone: 504-865-5000  
<http://www2.tulane.edu/main.cfm>

Contact: Eric Roque  
[eroque@tulane.edu](mailto:eroque@tulane.edu)

### Booth #27

The Medical University of Ohio and the University of Toledo have merged to form a new University of Toledo (UT). UT is a diverse institution that offers enhanced programs, research opportunities, and more professional programs and degree options to students. UT has many options in our College of Graduate Studies, College of Law, College of Pharmacy, and College of Medicine. With a research budget of more than \$56 million, UT has positioned itself as a future medical and technical research powerhouse in the rankings of research funding from the National Science Foundation and the National Institutes of Health.

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## UC Irvine – Office of Graduate Studies (University of California, Irvine)

120 Aldrich Hall  
Irvine, CA 92697  
<http://www.rgs.uci.edu/grad/>  
Phone: 949-824-4611  
Fax: 949-824-9096

Contact: Emma Ledesma  
[eledesma@uci.edu](mailto:eledesma@uci.edu)

### Booth #41

The University of California, Irvine Graduate Division represents 100 graduate programs from 10 academic schools including the Arts, Biological Sciences, Education, Engineering, Humanities, Interdisciplinary Studies Informational and Computer Sciences, Physical Sciences and Social Sciences in addition to the two professional schools of Business and the College of Health Sciences. For additional information on UC Irvine please visit <http://www.rgs.uci.edu/grad/> and for information on our graduate preparation and student programs please visit <http://www.rgs.uci.edu/grad/diversity/undergrad.htm>

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## United Negro College Fund Special Programs Corporation

2750 Prosperity Ave.  
Suite 600  
Fairfax, VA 22031  
<http://www.uncfsp.org/>

Contact: Dr. Melissa Green  
[melissa.green@uncfsp.org](mailto:melissa.green@uncfsp.org)  
703-205-7636  
Ms. Sondra Lancaster  
[Sondra.lancaster@uncfsp.org](mailto:Sondra.lancaster@uncfsp.org)  
703-205-8137

### Booth #20

Founded in April 2000, the United Negro College Fund Special Programs (UNCFSP) is an independently established 501(c)3 nonprofit organization with the broad mandate of serving not only historically black colleges and universities (HBCUs), but all minority institutions, domestic and international, including HSIs, TCUs, and other minority institutions (OMIs). Since inception, UNCFSP has designed and implemented national and international programs to address campus education and research infrastructure, public health, international affairs and development, policy analysis, international education, and science, technology, engineering, and mathematics. Our programs are helping federal agencies and public and private industries to diversify their workforce with highly skilled, competitive individuals from all underserved and underrepresented populations.



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**University of Alabama at Birmingham—Vision Science Graduate Program**

924 18th Street South  
Birmingham, AL 35294  
Phone: 205-934-6743

Contact: Ramona Hart and Clifford L. Kennon  
rhart@uab.edu

**Booth #17**

The University of Alabama at Birmingham Vision Science Graduate Program proudly offers a wealth of research experience and resources. Robust imaging and analytical tools, augmented by more than 30 campus core facilities at one of the leading research institutions in the southeast, empower our students and faculty to make advancements on many fronts. At present, faculty members are actively investigating the impact and treatment of ocular diseases, aging, refractive error (myopia and hyperopia), and modifying refractive applications. The program has an excellent record of preparing students for careers in teaching, research, and health care. We invite you to be a part of our program.

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**University of Arizona Graduate College Diversity Office**

1031 N. Mountain Avenue  
Tucson, AZ 85721  
Phone: 520-626-0095  
<http://grad.arizona.edu>

Contact: Sandra Bartell  
bartell@email.arizona.edu

**Booth #21**

The University of Arizona (UA) is research extensive and a major center for biomedical research, offering programs in Biochemistry, Molecular Biophysics, Cellular and Molecular Biology, Chemistry, Immunobiology, Medical Pharmacology, and Microbiology. Biomedical interdisciplinary programs include Applied Mathematics (biomathematics), Biomedical Engineering, Cancer Biology, Epidemiology, Genetics, Neuroscience, Nutritional Sciences, Pharmaceutical Sciences, Pharmacology/Toxicology, and Physiological Sciences.

Graduate programs offered in engineering are Aerospace/Mechanical, Agricultural and Biosystems, Chemical and Environmental, Civil/Mechanical, Hydrology and Water Resources, Material Science, Mining and Geological, and Systems and Industrial.

For details on funding opportunities and retention programs, visit Graduate College Diversity Programs. The UA also offers underrepresented upper-division students summer research opportunities. [http://grad.arizona.edu/prospective\\_students/underrepresented\\_students/](http://grad.arizona.edu/prospective_students/underrepresented_students/)

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**University of California, Los Angeles**

1252 Murphy Hall  
Box 951419  
Los Angeles, CA 90095-1419  
Phone: 310-825-3829  
<http://www.ucla.edu>

Contact: Barbara Ige  
bige@gdnet.ucla.edu

**Booth #45**

The University of California, Los Angeles (UCLA), is world-renowned for its faculty and student research programs, ranking first among the UC campuses in both the number and dollar amount of research awards received. Situated in one of the world's most culturally diverse cities, the campus is home to the largest UC graduate study body. UCLA AGEP's programs support the academic and professional success of underrepresented students with funding, mentoring, and academic advancement awards for research and conference travel. Committed to diversity, UCLA is a proven leader in providing pathways for student success from undergraduate through to postdoctoral positions.

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**University of California, San Francisco**

1675 Owens Street, Box 0523  
San Francisco, CA 94143  
Phone: 415-476-9000  
<http://www.ucsf.edu>

Contact: Contact: Kimberly A. Kempadoo

**Booth #26**

University of California, San Francisco (UCSF), is the only UC campus dedicated to the health sciences and is home to 17 PhD programs in biological and biomedical sciences, quantitative and systems biology, and social and behavioral sciences, as well as professional degrees in medicine, dentistry, pharmacy, and nursing. UCSF is ranked fourth in National Institutes of Health funding, and virtually all of the graduate programs are nationally ranked in the top 10. UCSF has 15 research institutes, more than 1,500 laboratories, 3,000 ongoing research projects, and 1,700 faculty. Of the 2,900 students, 54% are minorities and 64% are women. UCSF is continuing to increase its PhD enrollments to provide new opportunities in emerging disciplines.

# Exhibitors

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## University of Colorado at Boulder Graduate School Regent Administrative Center 26 UCB

Boulder, CO 80309  
<http://www.colorado.edu/GraduateSchool>

Contact: Deborah K. Irwin  
Coordinator of Graduate Student Services  
Graduate School  
[deborah.irwin@colorado.edu](mailto:deborah.irwin@colorado.edu)  
Phone: 303-735-2523  
Fax: 303-492-5777

### Booth #34

The Graduate School at the University of Colorado (UC) at Boulder offers strong foundational programs, outstanding teaching and research opportunities, and interdisciplinary connections that produce highly marketable graduate degrees. Specifically, the Graduate School offers 47 doctoral and 63 master's degree programs.

At the premier research institution in the Rocky Mountain region, you'll find strong foundational programs and interdisciplinary work that lead to highly valued degrees in a wide range of disciplines: Arts and Sciences, Business,

Education, Engineering, Journalism, Law, and Music.

With quality programs across all of the major academic disciplines, a UC-Boulder graduate education offers students the opportunity to expand their educational interests into a variety of practical, real-world possibilities and advance their personal and career goals.

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## University of Connecticut – Graduate School

438 Whitney Road Extension  
Storrs, CT 06269-4056  
Phone: 860-486-3620 or 860-486-3617  
Fax: 860-486-6739  
<http://www.grad.uconn.edu/>  
<http://www.uconn.edu/>

Contacts: Dr. Lee Aggison, Jr. - [lee.aggison\\_jr@uconn.edu](mailto:lee.aggison_jr@uconn.edu)  
Dr. Ruth Washington - [ruth.washington@uconn.edu](mailto:ruth.washington@uconn.edu)

### Booth #37

The University of Connecticut is a vibrant learning and research community providing academic programs designed to challenge an array of intellectual interests. We offer doctoral programs that are advanced, focused, scholarly, and dedicated to your holistic development as a researcher and educator. With more than 80 graduate programs, we help each individual reach personal post-secondary education goals.

The STEM fields offer many avenues to successful careers. Professionals in the STEM fields prosper as leaders at the forefront of scientific discovery and inquiry. All students pursuing advanced study in STEM fields find a welcoming community at the University of Connecticut.

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## University of Delaware

201 Evans Hall  
Newark, DE 19702  
Phone: 302-831-8830  
Fax: 302-831-4514  
<http://www.udel.edu>

Contact: M. Bremner  
[mbremner@ee.udel.edu](mailto:mbremner@ee.udel.edu)

### Booth #2

The NSF-sponsored Sustainable Energy from Solar Hydrogen IGERT program at the University of Delaware focuses on developing new approaches to sustainable energy. By working across the disciplines, we want our students to recognize and develop new approaches to solar hydrogen components, systems, and implementation.

Already into its second year, this program draws students and faculty from Electrical and Computer Engineering, Mechanical Engineering, Chemical Engineering, Materials Science, Chemistry, Physics, and Economics and Policy.

Our IGERT program provides excellent financial incentives, a stimulating work environment, and state-of-the-art facilities.

Come and be a part of something truly sustainable!

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## University of Maine

5782 Winslow Hall  
Orono, ME 04469  
Phone: 207-581-1110  
<http://www2.umaine.edu/graduate>

Contact: Ms. Amaranta Ruiz-Nelson  
[graduate@maine.edu](mailto:graduate@maine.edu)  
Coordinator of Graduate Student Services  
Graduate School  
University of Maine

### Booth #35

The University of Maine is the state's only Carnegie doctoral-research extensive university and the flagship campus of the University of Maine System. The doctorate is available in 26 areas of study, and the master's degree may be earned in over 65 areas.

Located along the scenic Stillwater river, the 1,100-acre campus boasts state-of-the-art research facilities and numerous opportunities for interdisciplinary research at such centers as the Laboratory for Surface Science and Technology, the Institute for Molecular Biophysics, the Climate Change Institute, the Margaret Chase Smith Center for Public Policy, the National Center for Geographic Information and Analysis, or the Mitchell Environmental Center for Watershed Research.

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**University of Massachusetts Amherst  
The Northeast Alliance for Graduate Education and  
the Professoriate (NEAGEP)**

Goodell Bldg., 140 Hicks Way, Office 1, Room 524  
Amherst, MA 01003  
Phone: 413-577-4178  
Fax: 413-577-1680  
<http://www.neagep.org/details.asp>

Contact: Michael Alderman  
[alliance@grad.umass.edu](mailto:alliance@grad.umass.edu)

**Booth #31 and #33**

The NSF-sponsored Northeast Alliance for Graduate Education and the Professoriate (NEAGEP) at the University of Massachusetts Amherst supports a number of activities designed to address the shortage of U.S. students, particularly underrepresented minority students, who receive PhDs in STEM and become professors. Students accepted into STEM programs at the University of Massachusetts Amherst are offered financial support packages and supportive mentoring to ensure that their graduate school experiences are successful as well as rewarding. Students in this program are encouraged to consider entering the professoriate once they have received their PhD.

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**University of Michigan- The Graduate School**

915 E. Washington  
Ann Arbor, MI 48107  
<http://www.umich.edu/>  
(734) 764-8129

Contact: Robin A. Rennie

**Booth #51**

Internationally renowned for research and education, the University of Michigan offers a wide variety of degree programs for undergraduate and graduate students. Students experience the "Michigan Difference" and our strong tradition of excellence in the classroom, on the playing field, and in the community.

Outstanding and innovative academic offerings combine with a diverse campus community, the best faculty, and a central location in beautiful Ann Arbor to make it one of the nation's most desirable universities.

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**University of Minnesota/ Combined MD/PhD Training Program**

MML 293 B690 Mayo  
420 Delaware St. SE  
Minneapolis, MN 55455  
Phone: 612-625-5000  
<http://www1.umn.edu/twincities/index.php>

Contacts: Susan Shurson, M.A./Assistant Director  
Combined MD/PhD Training Program  
[shursoo2@umn.edu](mailto:shursoo2@umn.edu)  
612-625-3680

Jon Gottesman, Director, Office of Recruiting for the Biomedical Sciences Graduate Programs

**Booth #19**

The overarching goal of the University of Minnesota's Combined MD/PhD Program is to attract and challenge the most gifted students to obtain exceptional training in medicine and a research area of their choice, preparing them for leadership roles in academic medicine. We have been competitively funded as a National Institutes of Health (NIH) Medical Scientist Training Program (MSTP) since 1988 and reside in the heart of the University of Minnesota's Twin Cities campus. The University of Minnesota ranks among the top 10 public research universities in both NIH funding and federal funding for science and engineering.

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**University of North Carolina at Chapel Hill**

4109 Neurosciences Research Bldg., CB 7100  
Chapel Hill, NC 27599  
Phone: 919-962-2211  
<http://www.unc.edu>

Contact: Carolyn Fahey  
[cfahey@med.unc.edu](mailto:cfahey@med.unc.edu)

**Booth #56**

The University of North Carolina at Chapel Hill has existed for two centuries as the nation's first state university. Through its excellent undergraduate programs, it has provided higher education to 10 generations of students, many of whom have become leaders of the state and the nation. Since the nineteenth century, it has offered distinguished graduate and professional programs.

# Exhibitors

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## University of Pennsylvania, School of Engineering and Applied Science

111 Towne Building  
220 S. 33rd Street  
Philadelphia, PA 19104-6391  
Phone: 215-898-0221

Contact: Victoria White  
Program Coordinator  
University of Pennsylvania,  
School of Engineering and Applied Science Biotechnology  
vwhite2@seas.upenn.edu

### Booth #6

Engineering at the University of Pennsylvania offers an exciting and rich intellectual environment in which to pursue your graduate training. Consistently top ranked, Penn provides a dynamic setting, world-class faculty, and a highly selective and diverse student body representing all corners of the U.S. and the world. Choose among 13 master's degrees and 6 PhD programs. Penn offers a stimulating and challenging environment, student-faculty research collaboration, and scholarly interactions with Medicine, Arts and Sciences, and Business (Wharton School), to name a few. Prepare to become a global leader in your field. Join us here at Penn! [www.seas.upenn.edu/grad](http://www.seas.upenn.edu/grad). Email: [gradstudies@seas.upenn.edu](mailto:gradstudies@seas.upenn.edu).

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## University of Texas Southwestern Medical Center at Dallas, Southwestern Graduate School of Biomedical Sciences

5323 Herry Hines Boulevard  
Dallas, TX 75390  
Phone: 214-648-6708  
Fax: 214-648-2102  
<http://www.utsouthwestern.edu/graduateschool/index.html>

Contact: Nancy Street  
[nancy.street@utsouthwestern.edu](mailto:nancy.street@utsouthwestern.edu)

### Booth #30

The University of Texas (UT) Southwestern Medical Center at Dallas provides opportunities for students to prepare for careers in the biomedical sciences through study and research leading to the PhD degree through the Division of Basic Science and the MD/PhD degree through the Medical Scientist Training Program. Biomedical research can be pursued in eight graduate programs in the areas of biological chemistry, cell regulation, genetics and development, immunology, integrative biology, molecular biophysics, molecular microbiology, and neuroscience. Additional areas of graduate study include cancer biology, chemistry, computational biology, and pharmacology. These graduate programs are interdisciplinary by design, and each reflects an area of research strength of the 242 Graduate School faculty. The most important element shared by the programs is an intense and exciting research experience in an active, productive, and critical scientific environment; this is the essence of graduate education at UT Southwestern.

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## University of Toledo— College of Medicine

3045 Arlington Avenue M.S. 1043  
Toledo, OH 43614

Contact: James Kleshinski  
[sandy.hassell@utoledo.edu](mailto:sandy.hassell@utoledo.edu)

### Booth #55

The Medical University of Ohio and the University of Toledo have merged to form a new University of Toledo. UT is a diverse institution that offers enhanced programs, research opportunities, and more professional programs and degree options to students. UT has many options in our College of Graduate Studies, College of Law, College of Pharmacy, and College of Medicine. With a research budget of more than \$56 million, UT has positioned itself as a future medical and technical research powerhouse in the rankings of research funding from the National Science Foundation and the National Institutes of Health.

---

## University of Utah, Bioscience Programs

30 North 1900 East, 5R441 SOM  
Salt Lake City, UT 84132  
Phone: 801-585-6408  
Fax: 801-585-6364  
[www.bioscience.utah.edu/index.html](http://www.bioscience.utah.edu/index.html)

Contact: Tami Brunson  
Tami Brunson, Janet Bassett and Anthea Letsou  
[janet.bassett@path.utah.edu](mailto:janet.bassett@path.utah.edu)

### Booth #23

The Bioscience Programs at the University of Utah include the Biological Chemistry, Molecular Biology, MD/PhD, and Neuroscience programs. We have more than 170 faculty drawn from 19 departments, with many research interests. For a listing of these areas, please visit our website at [www.bioscience.utah.edu](http://www.bioscience.utah.edu). The current fellowship amount is \$25,000 per year. Additionally, tuition waivers and health insurance are provided to all accepted students.

Interested? You will be even more interested when you find out how great it is to live in Utah. Please take the opportunity to visit our website and see how our combination of science and lifestyle are unmatched in the nation.

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**University of Virginia  
Office of Research and Graduate Studies**

Thornton Hall, A123  
PO Box 400882  
Charlottesville, VA 22904  
Phone: 434.243.4014  
[www.virginia.edu/vprgs/gradstudies](http://www.virginia.edu/vprgs/gradstudies)

Contact: Cheryl Evans  
[cbe3x@virginia.edu](mailto:cbe3x@virginia.edu)

**Booth #61**

The University of Virginia (U.Va.) is one of the top public universities in the nation, ranked 22nd overall by U.S. News and World Report and with 10 top-25 departments for graduate study. U.Va. offers graduate degrees in nine schools: Graduate Schools of Arts and Sciences, Graduate School of Architecture, Darden Graduate School of Business Administration, Graduate School of Commerce, Curry Graduate School of Education School of Graduate Engineering and Applied Science, School of Law, School of Medicine, School of Graduate Nursing, and the School of Continuing and Professional Studies.

Information on these programs will be available during this conference.

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**University of Washington**

Box 357275  
Seattle, WA 98195  
Phone: 206-685-3156  
<http://depts.washington.edu/mcb/home.php>

Contact: Terry Duffey  
[tduffey@u.washington.edu](mailto:tduffey@u.washington.edu)

**Booth #16****Molecular and Cellular Biology Program—University of Washington**

Recognizing the need for highly trained scientists conversant across disciplines, the University of Washington, the Fred Hutchinson Cancer Research Center (FHCRC), and the Institute for Systems Biology (ISB) have collaborated to create an interdisciplinary research program, the Molecular and Cellular Biology Graduate Program (MCB).

For more than 15 years, MCB has combined the strengths of the FHCRC together with the top ten University of Washington departments—from Biochemistry to Pharmacology—to foster an innovative and flexible education-training program for graduate students interested in biomedical problems that cross disciplinary boundaries. Most recently, ISB has joined this collaborative effort.

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**US EPA—National Health and Environmental Effects  
Research Laboratory**

1109 Alexandria Drive  
Research Triangle Park, NC 27711

Contact: Howard Barry  
[howard.barry@epa.gov](mailto:howard.barry@epa.gov)  
919-541-2729  
John Jones  
[jones.john@epa.gov](mailto:jones.john@epa.gov)  
919-541-2883

**Booth #4**

Research conducted under the direction of the EPA's Office of Research and Development (ORD) at the National Health and Environmental Effects Research Laboratory (NHEERL) provides the basis for the formulation of environmental policies and programs that span the breadth of environmental research in the world today.

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**Western University of Health Sciences**

309 E. Second Street  
Pomona, CA 91766  
Phone: (909) 623-6116  
<http://www.westernu.edu/xp/edu/cahp/home.xml>

Contact: [garcia@westernu.edu](mailto:garcia@westernu.edu)

**Booth #9**

Founded in 1977, Western University of Health Sciences is a nonprofit, graduate university for the health professions located next to Southern California's historic downtown Pomona. With five colleges and 1,500 students studying toward advanced degrees in osteopathic medicine, pharmacy, graduate nursing, physical therapy, physician assistant studies, health professions education, and veterinary medicine, Western University is one of the largest graduate schools for the health professions in California.

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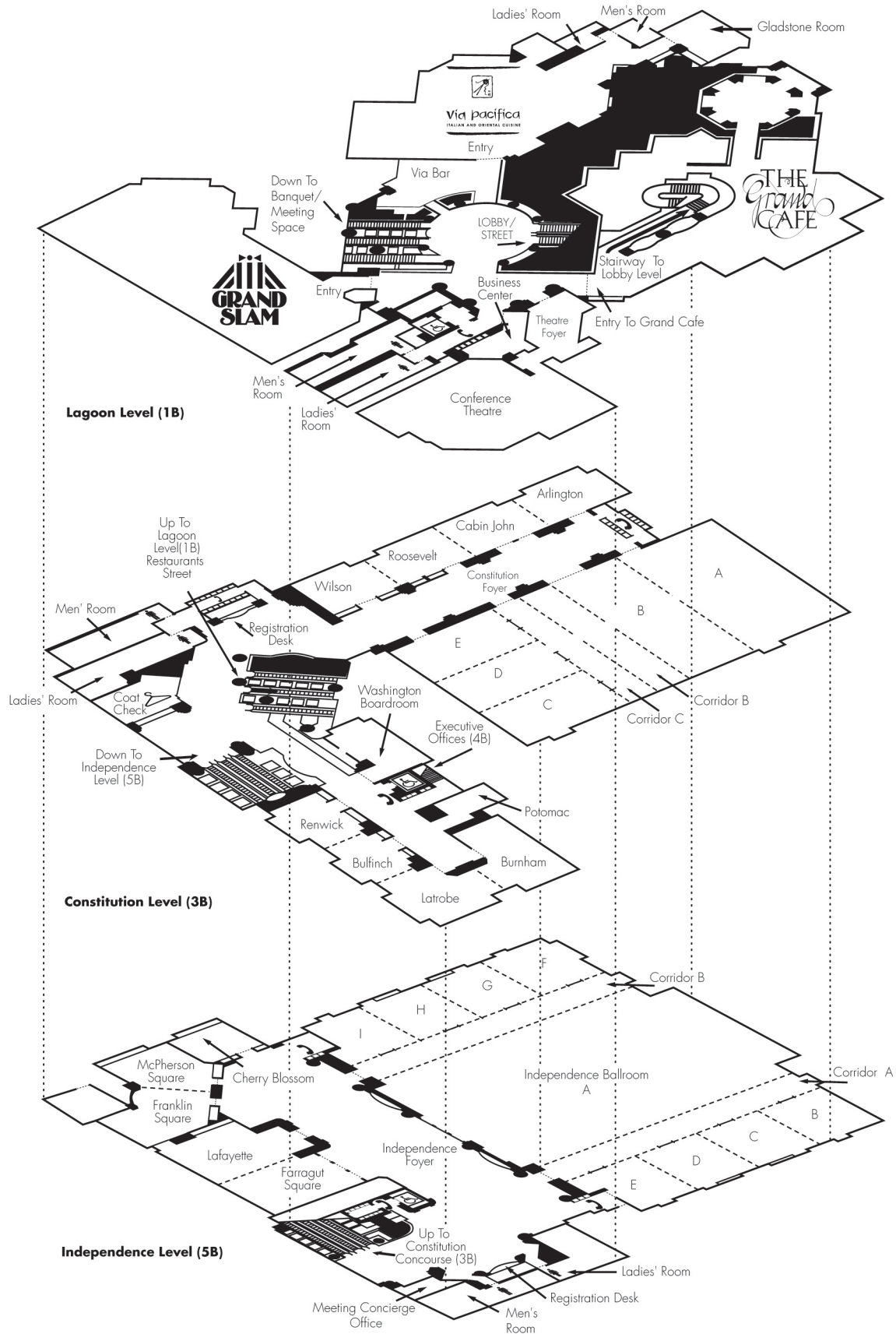
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# Hotel Map











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