

# 6th Annual Graduate Research Symposium

March 30-31, 2007

THE COLLEGE OF WILLIAM & MARY  
UNIVERSITY CENTER  
WILLIAMSBURG, VIRGINIA

*"Preparing Scholars, Presenting Excellence"*



THE COLLEGE OF WILLIAM & MARY  
WM  
ARTS & SCIENCES



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## Schedule at a Glance

### Friday, 30 March 2007 -- University Center

7:15 am - 8:00 am	Registration <i>2nd Floor Lobby</i>
8:00 am - 9:00 am	Concurrent Sessions <i>Tidewater A, Tidewater B, James Room, and York Room</i>
9:10 am - 10:40 am	Professional Development Workshop <i>Chesapeake C</i>
10:50 am - 11:50 am	Concurrent Sessions <i>Tidewater A, Tidewater B, James Room, and York Room</i>
11:50 am - 1:00 pm	Lunch & Welcoming Remarks <i>Chesapeake A</i>
1:10 pm - 2:10 pm	Concurrent Sessions <i>Tidewater A, Tidewater B, James Room, and York Room</i>
2:20 pm - 3:20 pm	William Small Distinguished Lecture in Physics <i>Commonwealth Auditorium</i>
3:30 pm - 4:30 pm	Distinguished Lecture in Biology <i>Tidewater A</i>
3:30 pm - 4:30 pm	Concurrent Sessions <i>James Room, York Room, and Colony Room</i>
4:40 pm - 5:40 pm	Barnes & Noble Book Lecture <i>Commonwealth Auditorium</i>
6:00 pm - 7:30 pm	Reception and Book Signing <i>Chesapeake A</i>

### Saturday, 31 March 2007 -- University Center

8:00 am - 8:30 am	Registration <i>2nd Floor Lobby</i>
8:40 am - 11:00 am	General Interest Lectures <i>Tidewater B</i>
8:40 am - 9:40 am	Concurrent Sessions <i>James Room and York Room</i>
9:50 am - 10:50 am	Concurrent Sessions <i>James Room and York Room</i>
11:00 am - 12:00 pm	Concurrent Sessions <i>James Room and York Room</i>
11:00 am - 12:00 pm	Poster Session <i>2nd Floor Lobby</i>
12:10 pm - 1:30 pm	Luncheon and Awards Ceremony <i>Tidewater A</i>

Dear Members of the William & Mary Community and Guests,

Welcome to Williamsburg, Virginia, and the Sixth annual Graduate Research Symposium. The Symposium Planning Committee has organized a memorable event for us all, and we look forward sharing it with you.

We hope that you will attend several of the more than 80 engaging presentations and poster sessions that will both challenge and broaden your knowledge. A unique event, the Symposium encourages interdisciplinary exchange, bringing together graduate students from the sciences and the humanities. This is an exciting opportunity to share experiences common to students in all graduate school communities.

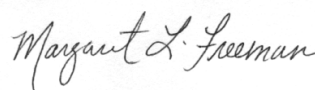
This year the Symposium is delighted to share the meeting with colleagues from prominent regional institutions. We welcome to our campus the nineteen visiting presenters, which include representatives from the following schools: The George Washington University, Georgetown University, Johns Hopkins University, Old Dominion University, Virginia Polytechnic Institute and State University, and the University of South Carolina. We are also pleased to welcome participants from the Virginia Institute of Marine Science.

In addition to the various graduate presenters, this year's Symposium features several special guest speakers, including Robin Cantor-Cooke, Dr. Roger Gosden, Dr. William Phillips, and Dr. Randal Pinkett. Further information on each of these distinctive visitors is available in the following pages of the program. We thank all of the speakers for joining our event and helping to produce a truly extraordinary conference experience.

As always, we want to make this event the best that it can possibly be. Thus, we appreciate your feedback on our planning and execution of this two-day gathering. At your leisure, please take a moment to fill out the survey provided. We look forward to meeting all of you during the Symposium and hope that you enjoy the festivities.



Pjerin Luli  
Co-Chair



Margaret L. Freeman  
Co-Chair





**THE COLLEGE OF WILLIAM AND MARY IN VIRGINIA**

OFFICE OF THE PRESIDENT

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March 30, 2007

Dear Students, Faculty, Friends, and Guests:

Welcome to the sixth annual Graduate Research Symposium at the College of William & Mary.

Though the College's name reflects William & Mary's historical reputation for offering a superb undergraduate education, we are also home to some of the best graduate and professional programs—and some of the brightest and most creative young scholars—in the world.

The innovative scholarship and research of William & Mary graduate students helps our College fulfill its essential charge to be a great and public university. Whether it is our marine scientists, who help us become better stewards of our environment, or our historians, who help us understand the present by explaining the past, the ideas that are born and fostered here better the lives of the people of our Commonwealth, our nation, and our world.

But our College is just one part of a much broader network of learning. I'm pleased to welcome the graduate students from other universities who are participating in the Symposium as well. Your presence encourages the spirit and process of collegial exchange that makes scholarship a human endeavor as well as an academic one. We're glad you're here.

Welcome again, and enjoy the Symposium.

All the best,

A handwritten signature in black ink, reading "Gene Nichol".

Gene R. Nichol  
President





## ***The College of William and Mary***

*The College of William and Mary is the nation's second oldest university and noted as the best small public university in the nation. Founded in 1693 by Royal Charter from King William III and Queen Mary II of Great Britain, the College is rooted in history and tradition. The Sir Christopher Wren Building is the oldest academic building in continuous use in the United States, constructed between 1695 and 1699. Phi Beta Kappa, the nation's oldest premier academic honor society, and the student honor code were founded at William and Mary. The College also maintains the historic post of Chancellor---currently held by former Supreme Court Associate Justice, the Honorable Sandra Day O'Connor. Although traditions are strong on the historic campus, William & Mary is a center for innovation and research. As our President, Gene R. Nichol, has remarked, "It is no exaggeration to say that the future is being shaped and formed in William & Mary's laboratories, classrooms, libraries and, often in places, well beyond." The "future" can be seen now at the 6th Annual Graduate Research Symposium.*

## ***Historic Williamsburg***

*Come see where America began — Virginia's Historic Triangle: Williamsburg, Jamestown and Yorktown. Visit Jamestown, established in 1607, and site of the first permanent English settlement in the "New World." 2007 will mark the 400<sup>th</sup> anniversary of our nation's birthplace and an 18-month long slate of events beginning in fall 2006 and continuing through the spring of 2008 will commemorate this milestone in our nation's history. For more information on attractions, events, accommodations, and things to do while in our area go to, <http://www.visitwilliamsburg.com/visit.htm>.*

## Friday, March 30 PROGRAM SCHEDULE

2007 Program Schedule Friday, March 30			
7:15 AM - 8:00 AM REGISTRATION 2nd Floor University Center			
Tidewater A	Tidewater B	James Room	York Room
<b>Session Chair: Dr. Joshua Erlich</b> 1. GLOVER, Brian (Physics) <i>College of William &amp; Mary</i> 2. MAWLER, Stuart (Science & Tech. Studies) <i>Virginia Tech University</i>	<b>Session Chair: Dr. Joanne Bowen</b> 1. CHESNEY, Sarah (Anthropology) <i>College of William &amp; Mary</i> 2. LIGHTFOOT, Dessa (Anthropology) <i>College of William &amp; Mary</i> 3. ROEBER, Catharine Dann (History) <i>College of William &amp; Mary</i>	<b>Session Chair: Dr. Christopher Del Negro</b> 1. PACE, Ryland (Applied Science) <i>College of William &amp; Mary</i> 2. HAYES, John (Applied Science) <i>College of William &amp; Mary</i> 3. YE, Jianmin (Marine Science) <i>Virginia Institute of Marine Science</i>	<b>Session Chair: Dr. Matthew Liebmann</b> 1. HOLLAND, Alissa Kate (Psychology) <i>Virginia Tech University</i> 2. CARMONA, Joseph E. (Psychology) <i>Virginia Tech University</i> 3. RANVILLE, Michelle (Public Policy) <i>George Mason University</i>
9:10 AM - 10:40 AM			
Professional Development Workshop - Chesapeake C			
Tidewater A	Tidewater B	James Room	York Room
<b>Session Chair: Dr. Henry Krakauer</b> 1. MAO, Dandan (Physics) <i>College of William &amp; Mary</i> 2. KWEE, Hendra (Physics) <i>College of William &amp; Mary</i> 3. PECHKIS, Daniel L. (Physics) <i>College of William &amp; Mary</i>	<b>Session Chair: Ms. Sarah Grunder</b> 1. KRUTKO, Erin (American Studies) <i>College of William &amp; Mary</i> 2. LANIER, Leonard (History) <i>Virginia Tech University</i> 3. HILPERT, Zach (American Studies) <i>College of William &amp; Mary</i>	<b>Session Chair: Dr. Daniel Cristol</b> 1. FRIEDMAN, Scott (Biology) <i>College of William &amp; Mary</i> 2. CONDON, Anne (Biology) <i>College of William &amp; Mary</i> 3. WEBB, Kristen (Biology) <i>George Washington University</i>	<b>Session Chair: Dr. Matthew Liebmann</b> 1. SIUDZINSKI, Meghan Habas (Anthropology) <i>College of William &amp; Mary</i> 2. MAHONEY, Shannon (Anthropology) <i>College of William &amp; Mary</i> 3. SALAMANCA, Maria (Anthropology) <i>College of William &amp; Mary</i>
11:50 AM - 1:00 PM			
Lunch & Welcoming Remarks - Chesapeake A			
Tidewater A	Tidewater B	James Room	York Room
<b>Session Chair: Ms. Barbara Monteith</b> 1. KUSCHNER, Karl (Physics) <i>College of William &amp; Mary</i> 2. SCHLEIF, Chris (Physics) <i>College of William &amp; Mary</i> 3. NOVICK, Jason (Physics) <i>College of William &amp; Mary</i>	<b>Session Chair: Ms. Kristen Proehl</b> 1. PIPER, Brian (American Studies) <i>College of William &amp; Mary</i> 2. SIMPSON, Jenna (American Studies) <i>College of William &amp; Mary</i> 3. WOOLSEY, John (Cultural Studies) <i>George Mason University</i>	<b>Session Chair: Dr. Stewart Ware</b> 1. HOEKSTRA, Luke (Biology) <i>College of William &amp; Mary</i> 2. MCGRATH, Patrick (Marine Science) <i>Virginia Institute of Marine Science</i> 3. CARLSON-DREXLER, Kiarstin (Biology) <i>College of William &amp; Mary</i>	<b>Session Chair: Dr. Sara LaLumia</b> 1. TERRIZZI, John (Psychology) <i>College of William &amp; Mary</i> 2. WEISSBURG, Paul (Public Policy) <i>George Mason University</i>
2:20 PM - 3:20 PM			
William Small Distinguished Lecture in Physics - Commonwealth Auditorium			
Tidewater A	James Room	York Room	Colony Room
<b>Distinguished Lecture in Biology</b> Dr. Roger G. Gosden	<b>Session Chair: Dr. Nikos Chrisochoides</b> 1. VASCONCELOS, Jorge (Computer Science) <i>Johns Hopkins University</i> 2. FEDEROV, Andriy (Computer Science) <i>College of William &amp; Mary</i> 3. CRUMP, Elizabeth (Computer Science) <i>College of William &amp; Mary</i>	<b>Session Chair: Dr. Arthur Knight</b> 1. MONTGOMERY, Chandra (American Studies) <i>College of William &amp; Mary</i> 2. PICKENS, Roxane (American Studies) <i>College of William &amp; Mary</i> 3. KOSANOVICH, Kevin (American Studies) <i>College of William &amp; Mary</i>	<b>Session Chair: Mr. Matt Young</b> 1. COHN, Randall (History) <i>George Mason University</i> 2. ROUGH, Jill A. (Public Policy) <i>George Mason University</i>
4:40 PM - 5:40 PM			
Barnes & Noble Book Lecture - Commonwealth Auditorium			
6:00 PM - 7:30 PM			
Networking Reception & Book Signing - Chesapeake A			



## Saturday, March 31 PROGRAM SCHEDULE

Saturday, March 31 8:00 AM - 8:30 AM REGISTRATION 2nd Floor University Center			
General Interest Lectures	James Room	York Room	
<b>8:40 AM - 9:20 AM</b> Tidewater B <b>Session Chair: Mr. Matt Young</b> 1. ARBOLEDA, Jandi (Counseling, Human, & George Washington University)	<b>8:40 AM - 9:40 AM</b> <b>Session Chair: Ms. Barbara Monteith</b> 1. GLASS, Andy (Biology) <i>College of William &amp; Mary</i> 2. LARSEN, Elise (Biology) <i>College of William &amp; Mary</i> 3. KIGHT, Caitlin (Applied Science) <i>College of William &amp; Mary</i>	<b>8:40 AM - 9:40 AM</b> <b>Session Chair: Dr. Gunter Luepke</b> 1. Yang, Ran (Applied Science) <i>College of William &amp; Mary</i> 2. HARRIS, Peter R. (Physics) <i>College of William &amp; Mary</i> 3. TEDDER, Sarah (Physics) <i>College of William &amp; Mary</i>	
<b>9:30 AM - 10:10 AM</b> <b>Session Chair: Dr. James Baroody</b> 1. KELLEHER, Aidan M. (Physics) <i>College of William &amp; Mary</i>	<b>9:50 AM - 10:50 AM</b> <b>Session Chair: Dr. John Swaddle</b> 1. HOUCK, Amanda (Biology) <i>College of William &amp; Mary</i> 2. GUNDERSON, Alex (Biology) <i>College of William &amp; Mary</i> 3. HOLLEY, Jonathan (Biology) <i>College of William &amp; Mary</i>	<b>9:50 AM - 10:50 AM</b> <b>Session Chair: Mr. Seth Feman</b> 1. HANCOCK, Jen (American Studies) <i>College of William &amp; Mary</i> 2. HERLEVI, April (Public Policy) <i>George Mason University</i>	
<b>10:20 AM - 11:00 AM</b> <b>Session Chair: Dr. Xipeng Shen</b> 1. VASCONCELOS, Jorge (Computer Science) <i>Johns Hopkins University</i>	<b>11:00 AM - 12:00 PM</b> <b>Session Chair: Dr. Patricia Barry</b> 1. UGONO, Onome (Chemistry) <i>Georgetown University</i> 2. SANDERSON, Jennifer (Chemistry & Biochem.) <i>Old Dominion University</i>	<b>11:00 AM - 12:00 PM</b> <b>Session Chair: Dr. William Fisher</b> 1. SROS, Lekhena (Health Services) <i>University of South Carolina</i> 2. RICHARD, Bonnie (Anthropology) <i>George Washington University</i> 3. FERGUSON, Rennie (Anthropology) <i>College of William &amp; Mary</i>	
1. FIRST, Megan (Biology) <i>College of William &amp; Mary</i> 2. GRESPIN, Matt (Biology) <i>College of William &amp; Mary</i> 3. GROFF, Jeffrey R. (Applied Science) <i>College of William &amp; Mary</i> 4. HOWIE, Mikaela (Biology) <i>College of William &amp; Mary</i> 5. HUBBARD, Joanna (Biology) <i>College of William &amp; Mary</i>	<b>11:30 AM - 12:00 PM</b> Poster Presentations - 2nd Floor Lobby 6. JONES, Peter C. (History) <i>James Madison University</i> 7. MILLEVILLE, Kelli A. (Marine Science) <i>Virginia Institute of Marine Science</i> 8. MINTON, Kelly (Biology) <i>College of William &amp; Mary</i> 9. MIRALDO, Peter (Physics) <i>College of William &amp; Mary</i> 10. PAQUETTE, Jay (Physics) <i>College of William &amp; Mary</i>	11. RICHARDSON, Steve (Physics) <i>College of William &amp; Mary</i> 12. SALAMANCA, Maria (Anthropology) <i>College of William &amp; Mary</i> 13. SCHMIDT, Kristie (Chemistry) <i>College of William &amp; Mary</i> 14. SINGER, Shereen A. (Psychology) <i>College of William &amp; Mary</i> 15. SPIER, Candace (Marine Science) <i>Virginia Institute of Marine Science</i>	16. VASCONCELOS, Jorge (Computer Science) <i>Johns Hopkins University</i> 17. XIAO, Yanli (Physics) <i>College of William &amp; Mary</i>
<b>12:10 PM - 1:30 PM</b> Lunch & Awards Ceremony - Tidewater A			

2007 Graduate Research Symposium Special Event  
Professional Development Workshop

## Robin Cantor-Cooke

### Enhance Your Presentation Skills: A Crash Course

March 30, 2007  
9:10 AM - 10:40 AM  
Chesapeake C

#### Abstract:

**ENHANCE YOUR PRESENTATION SKILLS: A CRASH COURSE**, presented by Robin Cantor-Cooke, is a 90-minute session that will help you walk into any room and speak to any audience with confidence, authority, and style. A condensed version of *Presenting Yourself With Confidence and Control*, the instructor's popular workshop, this session will teach you:

- how to manage your body and use it to enhance your presentation
- what to do with your hands (and what *not* to do)
- how to improve the sound of your voice through diaphragmatic breathing
- techniques to help you manage the jitters
- relaxation and visualization techniques to help you stop negative thinking ("I'm going to die up there-I just know it!") and start expecting yourself to do well

In 90 minutes, you will get the tools you need to present your authentic self in all its unique glory, rather than try to impersonate a "real" speaker who isn't you at all.

#### Biography:

**Robin Cantor-Cooke** has worked with some of the biggest stars in show business, including George Burns, Sid Caesar, Milton Berle, Helen Hayes, Charlton Heston, Keith Carradine, Marlo Thomas, Mariette Hartley, Jan Murray, and Red Buttons. She began her career as a stage actor in New York and Los Angeles, and has worked for the last twenty years as writer, editor, audio scriptwriter, and producer of more than forty books and tape programs. She holds a masters degree from the Medill School of Journalism at Northwestern University and is coauthor of *Satisfaction: Women, Sex, and The Quest for Intimacy* (Ballantine, 2007) and *Thriving with Heart Disease* (Free Press, 2004).

2007 Graduate Research Symposium Special Event  
William Small Distinguished Lecture in Physics

**Dr. William D. Phillips, NIST**  
1997 Nobel Prize for Physics

**Quantum Information: A 21st Century  
Revolution in Science and Technology**

March 30, 2007  
2:20 PM - 3:20 PM  
Commonwealth Auditorium

**Abstract:**

Two of the great scientific and technical revolutions of the 20th century were the discovery of the quantum nature of the submicroscopic world and the advent of information science and engineering. Both of these have had a profound effect on both our daily lives and on our world view. Now, at the beginning of the 21st century, we see a marriage of quantum mechanics and information science in a new revolution: quantum information. Quantum computation and quantum communication are two aspects of this revolution. The first is highly speculative: a new paradigm more different from that of today's digital computers than those computers are from the ancient abacus. The second is already a reality, providing information transmission whose security is guaranteed by the laws of physics. NIST's laser cooling and trapping group is studying the use of single, ultra cold atoms as quantum bits, or qubits, for quantum information processing.

**Biography:**

**Dr. William Phillips** is a leading researcher in ultra-low temperature atomic physics at the National Institute of Standards and Technology (NIST). His experiments using laser light to cool and trap atoms earned him the Nobel Prize for Physics in 1997, a prize that he shared with two other scientists for related research. Dr. Phillips is a member of the National Academy of Sciences; and a Fellow of the American Physical Society, the Optical Society of America, and the American Academy of Arts and Sciences.

Dr. Phillips received his Ph.D. in physics in 1976 and completed his postdoctoral research at the Massachusetts Institute of Technology. In 1978 he became a member of NIST, then the National Bureau of Standards, and it was there where he conducted his award winning research. The discipline of cooling and trapping atoms has allowed physicists to observe and measure quantum phenomena in atoms that defy the physical phenomena that occur at room temperature. In the mid-1980s, Phillips' team found serious discrepancies between its own measurements and the generally accepted "Doppler cooling limit." They demonstrated that it was actually possible to chill atoms well below the accepted limits down to a few microKelvins, or just millionths of a degree above absolute zero. This discovery, along with their earlier demonstration of magnetic trapping, paved the way for scientists seeking to create Bose-Einstein condensation, an exotic new form of matter in which atoms all fall into their lowest energy levels and merge into a single quantum state. Phillips and his team are continuing to study ultra-cold trapped atoms and the use of single such atoms as qubits for quantum information processing, for improved accuracy in atomic clocks, and in fabrication of nanostructures.

2007 Graduate Research Symposium Special Event  
Distinguished Lecture in Biology

**Dr. Roger G. Gosden, D.Sc.**  
Weill Medical College of Cornell University

## The Ovary: Model of Senescence or Fountain of Rejuvenescence?

March 30, 2007  
3:30 PM - 4:30 PM  
Tidewater A

### **Abstract:**

Oogenesis is a pivotal stage in the life cycle, yet no single strategy has evolved for oocyte production. In mammals, a consensus emerged over fifty years ago that the total population of ovarian oocytes is fixed before or soon after birth, and those subsequently lost by ovulation and follicular atresia cannot be replenished. This conclusion is consistent with the inexorable decline in follicle number with age that is probably universal in mammalian ovaries. Mathematical models of follicle dynamics in humans are also highly concordant with the menopausal age distribution, and the reproductive life span of our species is terminated by a low threshold number. Recent evidence has, however, contradicted the doctrine of a fixed population, suggesting that germ stem cells in the adult ovary can generate new gametes, and that the precursor cells are derived from the bone marrow. These claims will be discussed critically against a background of profound implications, if correct, for ovarian physiology and technologies for generating eggs for fertility treatment and cloning after nuclear transfer.

### **Biography:**

**Roger Gosden** began his career in Great Britain under the IVF pioneer, Robert Edwards, earning a Ph.D. from Cambridge University (1974) and a D.Sc. from Edinburgh University (1989), where he was a faculty member from 1976-94. He has been Scientific Director of reproductive sciences at Leeds University, McGill University and the Jones Institute in Norfolk, Virginia. Currently, he is Professor and Director of Reproductive Biology at Weill Medical College of Cornell University in New York City.

2007 Graduate Research Symposium Special Event  
Barnes & Noble Book Lecture and Book Signing

**Dr. Randal D. Pinkett, M.B.A.**

President and Chief Executive Officer, BCT Partners

## Campus CEO: The Student Entrepreneur's Guide to Launching a Multimillion-Dollar Business

March 30, 2007  
4:40 PM - 5:40 PM  
Tidewater A

### **Abstract:**

For a growing number of students, the financial pressures of college or graduate school may be more taxing than the academic rigors of campus life. As a result, students rely heavily on financial aid, loans, part-time jobs, and strict budgets. Many students take dead-end jobs with no relevance to their college programs, while others even work on a full-time basis.

However, students don't have to suffer through a penniless college existence, nor must they wait until after graduation to find achieve career fulfillment and make money. Instead, they can generate income by launching their own businesses while on campus, taking advantage of the period in their lives during which any number of once-in-a-lifetime perks and resources are readily available to them.

Entrepreneur, Ph.D., author, and community activist Dr. Randal Pinkett, Chairman and CEO of BCT Partners, will discuss how students can turn their academic and professional dreams into reality, and will share his own experiences doing so, including those, which led to his success in building a multimillion-dollar business and on the reality show *The Apprentice*.

### **Biography:**

**Dr. Randal Pinkett** has established himself as a scholar, entrepreneur and leader. He is the founder, chairman and CEO of BCT Partners, a multimillion-dollar management, technology and policy consulting services firm based in Newark, NJ, that works with corporations, government agencies and nonprofit organizations.

Pinkett holds five degrees including a B.S. in Electrical Engineering from Rutgers University where he competed on the track and field team as a high jumper and long jumper; an M.S. in Computer Science from the University of Oxford in England; and a M.S. in Electrical Engineering, MBA, and Ph.D. from MIT.

Pinkett was also the first African-American to be named a Rhodes Scholar at Rutgers University and was the winner of NBC's hit reality television show, "The Apprentice," with Donald Trump. In the process, he was selected as one of 18 candidates chosen from among one million applicants to compete for the opportunity to run one of Trump's companies. His first book, *Campus CEO: The Student Entrepreneur's Guide to Launching a Multimillion-Dollar Business*, was released in 2007, and he is currently co-authoring his second book, *Black Faces in White Places*, to be released in 2008.

Born in Philadelphia and raised in New Jersey, Dr. Pinkett is married to his wife, Zahara. He firmly believes that "to whom much is given, much is expected," so throughout his endeavors, he places great emphasis on giving back to the community.



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**M-F: 10AM-7PM**

**SAT: 10AM-6PM**

**SUN: 1PM-5PM**

### **Acculturation and Acceptance of Deafness among Asian and Asian American Deaf and Hard of Hearing People in the U.S.**

*Presenter:* Jandi Arboleda, Ph.D., George Washington University, Counseling, Human and Organizational Studies

This is an interrelationship study on the acculturation experiences of 166 Asian and Asian American deaf and hard of hearing individuals from across the United States. Two levels of acculturation (to Asian hearing culture and to American Deaf culture) were subjected to bivariate correlations to determine how they related to acceptance of deafness. A t-test and one-way ANOVAs determined if work-related variables made a difference on the level of acceptance of deafness. Multiple stepwise regression procedures determined if education and family hearing statuses predicted acceptance of deafness. The Suinn-Lew Asian Self-Identity Acculturation Scale or SL-ASIA (Suinn, Rickard-Figueroa, Lew, & Vigil, 1987) and the Asian Values Scale or AVS (Kim, Atkinson, & Yang, 1999) were adapted to measure acculturation to Asian hearing culture. The Deaf Cultural Identity Scale or DCIS (Gordon, 1997) and the Deaf Acculturation Scale or DAS (Maxwell-McCaw & Zea, 2001) were adapted to measure acculturation to American Deaf culture. The Acceptance of Deafness Scale or the ADS measured acceptance of deafness. A demographic questionnaire was developed to collect participant-related and other demographic variables. After statistical analyses, the following significant findings were obtained: (1) The less acculturated participants are to the behavioral aspects of Asian hearing culture, as measured by the SL-ASIA, the higher the level of acceptance of deafness; (2) The more acculturated participants are to American Deaf culture, as measured by the DAS Deaf identity subscale, the higher the level of acceptance of deafness; (3) The less acculturated participants are to American Deaf culture, as measured by the DAS hearing identity and preference subscales, and the DCIS marginal identity subscale, the higher the level of acceptance of deafness; (4) The age and the highest education level of the participants predict acceptance of deafness; and (5) The fathers' hearing status predict acceptance of deafness.

### **Microburst Damage in a North American Temperate Forest: Assessment and Forest Composition Reconstruction**

*Presenter:* Kjärstin Carlson-Drexler, College of William & Mary, Biology

The ability to recover from natural disturbance is an important factor determining the future success of an ecosystem. Hurricanes, like most natural disasters, affect the entire ecosystem, including all animal and plant species. Tree species, unlike animals, lack the ability to respond to a threat of disaster by finding shelter or relocating. Forests therefore experience high levels of damage during a hurricane, ranging from broken limbs and tree-falls to extensive areas of uprooted trees. In this study, I quantified damage to a 150 year old temperate forest caused by Hurricane Isabel in 2003. In contrast to most forests damaged by hurricanes, the site used for this study has not been salvage-logged, making pre-hurricane reconstruction possible. This study site was a multi-hectare microburst area in the College Woods of the College of William and Mary, located in Williamsburg, VA. I compared damage in the area of strong localized winds (microburst) to that in a less severely damaged area (reference). I set up 36 total plots in the microburst and reference areas of the forest, and recorded species, diameter at breast high (dbh), and damage for all trees larger than a minimum size. My hypothesis was that damage in the microburst area would not depend on tree species or size, while these characteristics would be important in the reference area. I compared relative density and basal area of each tree species between the microburst and less damaged area. In addition, I compared the amount of damage to each tree between the sites for species and size. These data will allow me to reconstruct pre-hurricane forest composition, as well as compare the damage caused by localized high wind speeds with that caused by more widespread, lower wind speeds. Preliminary results will be presented, and potential implications will be discussed.

## **The Role of Emotion in the Forgotten Sensory Modality: Exploring Anxiety and Hostility Contributions to the Vestibular System**

*Presenter:* Joseph E. Carmona, Virginia Tech University, Psychology

Dizziness is one of the most common complaints present in the primary care setting, with increased prevalence in the elderly. Loss of balance and falling in the elderly have severe medical consequences and create a significant toll on the economy through the health care expenditures of managed care. Yet the vestibular system, responsible for balance, postural stability, and spatial awareness, has historically been the least understood sensory modality, and the last to have the sensory organs formally recognized. The complexity and multifaceted origins of dizziness, in addition to the compromised accuracy of patient self-report throughout dizziness episodes renders assessment, diagnosis, and permanent treatment extremely difficult. Even less is known of the relationship between the higher order cognitive and affective processes of the cerebral hemispheres in negative emotions and vestibular dysfunction. Recent research suggests that the link between emotion and the primitive vestibular system may be more intimate than previously thought. Although many emotion specific models of hemispheric activation exist, none have been applied to the distinctly unpleasant emotions associated with vestibular disturbances which may not only include dizziness, but also severe nausea and motion sickness. The presentation will utilize examples from descriptive case studies, and single-subject and group experiments in an attempt to illustrate the role of emotion in modulating vestibular decompensation. Particular attention will be devoted towards the involvement of the frontal lobes and regions associated with arousal and aversive conditioning to provocative vestibular stimuli. Finally, we will present highlights of studies in progress, along with future directions for systematic exploration. With the burgeoning rise of the aging population, the need for integration of neuropsychological models of emotion with the vestibular system is a matter of increasing concern and is an investment towards creation of psychologically-based therapies specialized for dizziness management and fall prevention.

## **Grafting a Dominant Ideology: Greenhouses in the Eighteenth-Century Chesapeake**

*Presenter:* Sarah Chesney, College of William & Mary, Anthropology

Historical archaeologists have argued that the elaborately landscaped gardens of the eighteenth-century Chesapeake were conscious attempts by the elite governing class to reassert their control over a society that was quickly slipping away from them in the years leading up to the American Revolution. The gardens they created clearly emphasized their ability to manipulate nature on a vast scale and, thus, were intended to prove to the world that they ruled local government through an almost divine right (Leone 1984). Of course, this manipulation did not just apply to the carefully planned terraces, walks and foliage present in these gardens; the entire landscape of trees, natural topography, and architecture formed part of a consciously created master plan aimed at sending specific messages to all who came across it that elite control was stable and entrenched in the Chesapeake (Leone 1984; Ross 1998). How did greenhouses contribute to this elite strategy of social control and help shape an ideology that naturalized elite domination? Are they simply one type of outbuilding that forms part of the overall landscape, or do they have other, more nuanced, meanings? As both a utilitarian space for the winter storage of exotic plants and a summer space for outdoor garden parties greenhouses bridged the worlds of practical necessity and useless ornament. Greenhouses in the eighteenth-century Chesapeake were more than just overt status symbols of elite control; they functioned as specific reminders of an economic world dependent on overseas imports that, like the elite owners who financed it, was fast becoming a relic of a by-gone era.



## Incoherence and Exceptionality: The Trial of Adolph Eichman and the (mis)Use of Universality

*Presenter:* Randall Cohn, George Mason University, History

The 1961 trial of Adolph Eichmann in Jerusalem was one of the most famous and impactful international trials on record – and the indelible image of the unremarkable Eichmann sitting in a cage of bulletproof glass, listening to testimony from survivors through his translation headphones will likely remain lodged in the collective memory for generations to come. It marked a transformation in the way Israel talked about the Nazi holocaust, and helped eliminate the shame that, until that point, had divided the Israeli population. It galvanized the support of the remaining Jewish diaspora for the cause of Israel, and – by using the public forum to present graphic personal accounts to an international audience – provided much of the world with its first glimpse of what has now entered the collective consciousness as The Holocaust. It is also generally agreed among jurists and legal scholars that, according to the existing principles of international law – then and now – it was illegal. In this paper, I examine the ontological paradox at the root of the international legal discourse, and how the Eichmann trial and the controversies which surrounded it fit into – and exacerbate – that paradox. I also explore how the codification of the conventional Holocaust narrative simultaneously provided Israel with an important political tool and helped to render the international legal community unable to effectively protect against resurgent totalitarianism. Ultimately, I argue that the Eichmann trial must be understood as a dangerous political-legal precedent, not because it had overt political purposes (it did) or because it was a miscarriage of justice (it was not), but because of its contribution to the growing incoherence of the important discourses surrounding crimes against humanity and international law.

## Mercury Levels in Newly Independent Birds

*Presenter:* Anne Condon, College of William & Mary, Biology

Mercury levels in newly independent birds Anne Condon and Daniel A. Cristol Increased exposure to methyl mercury through anthropogenic sources poses potential health risks for wildlife; methyl mercury is readily bioaccumulated and biomagnified through the food web. In 2005, Cristol (unpublished data) found elevated blood mercury levels in insectivorous forest songbirds along a contaminated stretch of the South and Shenandoah Rivers, Virginia. Preliminary results also showed elevated blood mercury levels in adults compared with nestlings. The low levels of mercury in nestling blood are likely a result of mercury being excreted via growing feathers. A blood vessel in the feather shaft provides nutrients to growing feathers; mercury may be transported in the blood supply, binding preferentially to keratin as the feather forms. Once growth is complete, the vessel completely atrophies, rendering the feather physiologically separate from the body. When young birds fledge and feather growth has stopped, mercury will accumulate in the blood as they continue to forage on contaminated food items. We predicted that there would be an increase in blood mercury levels after fledging, when feather growth is complete and feathers can no longer serve as a reservoir for toxic mercury. There are few data documenting mercury effects during this already-sensitive period in a bird's life cycle. I studied post-fledging eastern bluebirds (*Sialia sialis*) from nest boxes placed along the contaminated portion of the South River, VA. I used radio telemetry to locate and trap individual birds (N=46) regularly to obtain blood samples over time (up to 92 days from fledging). Preliminary results show that blood mercury rises as feather growth stops.

## Exponentially Secure Tweakable Blockciphers

*Presenter:* Elizabeth Crump, College of William & Mary, Computer Science

A blockcipher is a pair of algorithms  $E$  and  $D$ , where  $E$  takes two inputs, a key and a message, and produces a ciphertext;  $D$  reverses the process. A blockcipher is secure if it is indistinguishable from a random permutation. A tweakable blockcipher is a blockcipher with an additional input, a tweak, which allows variability. Therefore a tweakable blockcipher's algorithm  $E$  takes 3 inputs, a key, a message, and a tweak, and produces a ciphertext; where  $D$  needs the key, the tweak, and the ciphertext to reverse the process. A tweakable blockcipher is considered secure if it is indistinguishable from a random permutation family. However, there are two levels of security of which we are concerned: chosen-plaintext secure and chosen-ciphertext secure. Blockciphers are chosen-plaintext secure if an adversary,  $A$  is unable to distinguish the blockcipher from a random permutation given a list of plaintext of his choosing and the corresponding ciphertexts; blockciphers are chosen-ciphertext secure if  $A$  is unable to distinguish it from random given a list of chosen ciphertexts and the corresponding plaintexts. Liskov, Rivest and Wagner constructed secure tweakable blockciphers that depend on the existence of an underlying blockcipher. An open problem proposed by Liskov et al. is to construct tweakable blockciphers directly. We prove that a tweak can be securely added to a seven-round Feistel construction for chosen-plaintext security, and that this construction is round optimal. We also prove that a tweak can be added to a ten-round Feistel construction for chosen-ciphertext security. We present Feistel constructions, and how they can be modified to allow for a tweak.

## Toward Real-Time, Image Guided Neuro-Surgery Using Distributed and Grid Computing

*Presenter:* Andriy Federov, College of William & Mary, Computer Science

Neurosurgical resection is a therapeutic intervention in the treatment of brain tumors. Precision of the resection can be improved by utilizing Magnetic Resonance Imaging (MRI) as an aid in decision making. Image registration adjusts pre-operative data according to intra-operative tissue deformation. Some of the approaches increase the registration accuracy by tracking image landmarks through the whole brain volume. High computational cost used to render these techniques inappropriate for clinical applications. In this paper we present a parallel implementation of a state of the art registration method, and a number of needed incremental improvements. Overall, we reduced the time required for registration of an average dataset from about an hour to less than seven minutes, which is within the time constraints imposed by neurosurgeons. For the first time in clinical practice we demonstrated, that with the help of distributed computing non-rigid MRI registration based on volume tracking can be computed intra-operatively.

### **An Anthropological Application of Population Modeling Using Matrices: How Long Did It Take For Modern Humans To Migrate Out of Africa?**

*Presenter:* Rennie Ferguson, College of William & Mary, Anthropology (Undergraduate)

The purpose of this project is to try to determine if the times at which anatomically modern humans left the different regions of the world, which was calculated with matrices, are in the same time ranges as archaeological findings of the first arrivals. Anatomically modern humans left Africa in a movement called 'Out of Africa II', which began roughly 120,000 years ago. In this mathematical model, the world is divided into seven geographic areas; Africa, the Middle East, Asia, Siberia, Alaska, North America, and South America. From this, a stage structured matrix model is formed that takes into account the self-growth of the population and the emigration level. It is assumed that at a certain population level, determined by the geographical area of each zone, that part of the population would leave the area and move to the next zone. The matrix is repeated, until the time it would have taken for the first anatomically modern humans to leave Alaska and enter North America is calculated. This time was found to be 16,775 years ago. After this stage in the matrix model, the model ceases to produce accurate results; this implies that something changed in terms of human population movement when humans reached North America. A major implication of this model is that it provides evidence in the debate between an earlier arrival time in Alaska, of 30,000 years ago, and a population movement down the west coast; either of these theories would explain a site in South America that predates those of North America. However, this model suggests, with a Siberian departure time of 19,575 years ago, that people would have entered Alaska close to then, as opposed to a 30,000 year date, instead supplying evidence for a movement down the west coast of North America.

### **The Effects of Nest Predation on the Age Structure of a Nesting Diamondback Terrapin Population**

*Presenter:* Megan First, College of William & Mary, Biology

The diamondback terrapin, the only aquatic turtle species to inhabit estuaries of the Atlantic and Gulf coasts, has been subjected to numerous environmental threats for over a century. Nest predation by raccoons is one of the current, serious threats to terrapin populations throughout most of their range. The proposed study will determine the impacts of nest predation on a population of terrapins inhabiting the Goodwin Islands complex in the Chesapeake Bay National Estuarine Research Reserve in Virginia. A recent study of the Goodwin Islands' terrapin population documented a west-to-east gradient in nest predation on the three islands. Raccoons consume nearly all available eggs on the western island, fewer on the middle island, and fewest on the eastern island. If nest site fidelity by terrapins is as strong as expected, then the outcome of differential predation along the islands should be that the population of nesting females will show a distinct difference in age structure and fecundity among the islands. To test this hypothesis, age will be determined for nesting females and the number of eggs per clutch will be counted and compared among islands. Older females are expected to be more numerous on the western island, with the greatest number of younger females on the eastern island. If a gradient in age structure does exist it would suggest that the nesting population on the western island is not successfully recruiting new breeders. The absence of a gradient in age structure would suggest either that nest site fidelity in female terrapins is not as strong as expected or that first year female breeders do not return to their birth site to nest. Females laying nests exposed to high rates of predation on the western island may buffer the potential impact of nest predation on the middle and east islands, thus ensuring the reproductive success of the Goodwin Islands terrapin population.

### Elevated Mercury Levels in a Terrestrial Songbird

*Presenter:* Scott Friedman, College of William & Mary, Biology

Mercury pollution resulting from industrial practices has become a global problem because mercury is highly toxic to humans and wildlife. During the first half of the 20th century, an industrial plant in Waynesboro, Virginia discharged mercury directly into a headwater of the Shenandoah River. In 2005-2006, Dr. Daniel A. Cristol documented the extent of mercury exposure in avian species nesting in the Shenandoah Valley in Virginia. Traditionally, research on mercury pollution has concentrated on aquatic systems because fish consumption is the main route of mercury exposure for humans. However, D. Cristol documented that, in a still undescribed process, the mercury from the Shenandoah River is somehow making its way out of the river and into the terrestrial environment, specifically terrestrial songbirds. Surprisingly, Carolina Wren, *Thryothorus ludovicianus*, blood mercury levels were elevated compared to wrens from uncontaminated reference sites and fish-eating kingfishers from the contaminated sites. Thus, contrary to previous dogma, terrestrial organisms are at risk of mercury contamination. Identifying through which prey items terrestrial organisms are accumulating mercury is necessary to determine which species are most at risk. In 2006, in an attempt to identify the prey items responsible for delivering mercury to Carolina Wrens, I collected over 100 prey items from nesting Carolina Wrens. These prey items were identified and analyzed for total mercury.

### Osprey Foraging Behavior and Population Response

*Presenter:* Andy Glass, College of William & Mary, Biology

The Chesapeake Bay osprey population has exhibited significant spatial variation in growth following the banning of DDT in 1972. The slowest growth rates have occurred around polyhaline waters in the stem of the Bay, where the greatest number of ospreys are found, while the fastest growth rates have occurred around tidal fresh and upper oligohaline waters. This may indicate that the polyhaline areas are nearing carrying capacity. Determining the ecological implications of this variable growth rate will provide valuable insight into the potential future trends of the Bay osprey population and, in general, the factors that influence osprey population dynamics. Food availability can be a strong limiting factor for wildlife populations, and recent anecdotal evidence of reduced osprey reproductive success in polyhaline areas suggests that this may largely be driving the differential growth. We hypothesize that the spatial variation in the osprey population growth rate reflects differences in reproductive success mediated through foraging efficiency. We predict that foraging becomes less optimal and reproductive success subsequently decreases in the Bay as salinity in corresponding habitats increases. To test this, we spatially evaluated osprey reproductive success and foraging efficiency along the salinity gradient in the lower Bay.

## Large Scale Structure as a Probe of New Physics

*Presenter:* Brian Glover, College of William & Mary, Physics

While we wait for the next generation of accelerators to fire, the particle physics community has searched for new ways to test models. One such test is to look for evidence of physics beyond the Standard Model in galaxy cluster count observations. As an example, for some models, distant objects would appear dimmer than expected since a fraction of the light emitted by objects in a galaxy would have been converted to other particles while traversing space. Such a dimming mechanism could make certain galaxy clusters unobservable to flux limited telescopes. After reviewing models of galaxy cluster formation, I'll show how a dimming mechanism can be incorporated and upon comparing to galaxy cluster surveys, show what constraints can be placed on new models.

## Analysis of Thyroid Hormone Receptor (TR) Nucleocytoplasmic Shuttling Using Fluorescence Recovery After Photo-bleaching In Multinucleate Live Cells

*Presenter:* Matt Grespin, College of William & Mary, Biology

The ability to regulate gene expression is critical to an organism's development, its maintenance of homeostasis, and its capability to respond to environmental stresses. Cells comprising an organism utilize proteins termed transcription factors to regulate expression of particular genes. The thyroid hormone receptor (TR) is a transcription factor which is capable of shuttling between the nucleus and the cytoplasm of a cell, thereby establishing spatial control for the genes it regulates in addition to temporal control. An important aspect in TR's nucleocytoplasmic shuttling is its ability to traverse the nuclear envelope through a proteinaceous structure called the nucleopore complex (NPC.) In general, shuttling transcription factors such as TR are "helped" through the NPC by chaperone proteins called karyopherins. One karyopherin which has been implicated in the nuclear export of a number of transcription factors is called Crm1. The Crm1 mediated nuclear export pathway is highly conserved in eukaryotes. Unlike many proteins, however, TR does not appear to interact directly with Crm1 during its nuclear export, pointing to the possibility of Crm1 independent nuclear export. Recently, several research groups have suggested that a number of structurally and functionally related transcription factors to TR may utilize a protein called calreticulin (CRT) in their nuclear export. CRT is a  $\text{Ca}^{2+}$  binding protein found primarily in the endoplasmic reticulum, where it functions in the regulation of folding and vesiculation of other proteins bound for the Golgi apparatus. Importantly, however, cytosolic and nuclear fractions of CRT have also been identified. Preliminary work in our lab suggests the interesting possibility that TR may utilize a cooperative export pathway involving the formation of a trimeric export complex in which CRT binds directly to TR and acts as an adaptor for TR binding of Crm1.

## Ryanodine Receptor Allosteric Coupling and the Dynamics of Calcium Sparks

*Presenter:* Jeffrey R. Groff, College of William & Mary, Applied Science

Localized  $\text{Ca}^{2+}$  elevations known as  $\text{Ca}^{2+}$  sparks are cellular signals that arise from the cooperative activity of ryanodine receptors clustered at  $\text{Ca}^{2+}$  release sites on the surface of the sarcoplasmic reticulum. In principle, the synchronous gating of ryanodine receptors can be mediated entirely through the buffered diffusion of intracellular  $\text{Ca}^{2+}$ . On the other hand, ultrastructural evidence that ryanodine receptors make physical contact with neighbors and the observation that ryanodine receptors in planar lipid bilayer can exhibit coupled gating when  $\text{Ca}^{2+}$  is not the current carrier both suggest that inter-protein allosteric interactions may contribute significantly to the dynamics of  $\text{Ca}^{2+}$  sparks. Here we present a minimal Markov chain model of a  $\text{Ca}^{2+}$  release site designed to investigate how allosteric interactions and coupling mediated by local  $\text{Ca}^{2+}$  may simultaneously contribute to spark dynamics. The ryanodine receptors are instantaneously coupled via the buffered diffusion of  $\text{Ca}^{2+}$  and experience nearest-neighbor allosteric interactions that are incorporated so as to stabilize or destabilize neighboring closed-closed, closed-open, and open-open channel pairs. We find that  $\text{Ca}^{2+}$  spark activity in Monte Carlo simulations may increase or decrease upon the addition of allosteric coupling that promotes synchronous gating. However, when the efficacy of  $\text{Ca}^{2+}$ -mediated channel coupling is varied, synchronizing allosteric interactions always lead to more robust  $\text{Ca}^{2+}$  sparks for some range of  $\text{Ca}^{2+}$  coupling strengths. We find that removing an increasing fraction of synchronizing closed-closed allosteric interactions increases spark duration, decreases inter-spark interval, and at first increases but ultimately decreases spark frequency. Finally, a mean-field approximation applicable to the dynamics of a ryanodine receptor cluster coupled via local  $\text{Ca}^{2+}$  and nearest-neighbor allosteric interactions is derived and validated against Monte Carlo simulations. The mean-field formalism aggregates states based on the number of open ryanodine receptors, but preserves the relationship between lumped rates and microscopic parameters.

## Pigments, Birds, Microbes, and a Novel Function of Avian Coloration

*Presenter:* Alex Gunderson, College of William & Mary, Biology

Feather colors derived from pigments serve many important functions in birds, such as signaling to potential mates and camouflage. However, feather color may also help maintain feather condition by slowing rates of bacterial feather degradation. A recent study suggests that feathers containing melanins (black or brown in color) are more resistant to bacterial degradation than unpigmented (white) feathers in vitro. Another study, using different methodology, concluded melanized feathers are less resistant to bacterial degradation than unpigmented feathers. We attempted to resolve these inconsistent observations. We hypothesized that pigmented feathers would degrade more slowly than unpigmented feathers. Feathers were collected from birds that have both melanized and unpigmented feathers. Each feather type from each species of bird was inoculated with one of two species of feather degrading bacteria, and rates of degradation were measured. Feathers with melanin pigments degraded more slowly than unpigmented feathers. Interestingly, each of the two bacterial species used in the experiment have a different strategy for degrading feathers, one of which has not been reported in the feather-degrading bacteria literature. The results of this study and others suggest that pigment deposition may protect feathers from microbial damage in the wild. Thus, the quantity of pigment deposited in feathers could signal an individual's ability to resist parasites to potential mates.

**WWJD: Morality Meets the Market**

*Presenter:* Jennifer Hancock, College of William & Mary, American Studies

What happens when religion becomes part of the culture industry? This paper will look at the first appearance of "What Would Jesus Do?" in a sermon series given by Progressive preacher and activist, Charles Sheldon in 1896. Sheldon's sermons addressed contemporary labor problems by promoting socialist solutions to the problems of industrial capitalism, and they were subsequently published as the best-selling paperback novel *In His Steps* – still in print today. This study will apply the Frankfurt School's critique of the culture industry to this best-selling novel to trace the movement of a pop cultural artifact into the mass market. The examination confirms some of Theodor Adorno's claims about the dangers and disappointments of the culture industry – namely that products become part of a cycle of manipulation that suppresses spontaneity, individuality and critical thought. However, due to religious content and devotional consumption, this mass paperback also challenges some of Adorno's critiques and solutions to the problem of the culture industry. The study of the novel and its decline in popularity in the 1920s also suggests some reasons behind the decline of mainline Protestantism in the 20th century, the merging of evangelicalism with commercial culture, and why WWJD came back in the 1990s in a very different way than its original concern for social justice. As part of dissertation research, this is a work in progress.

**Acoustic Ionization**

*Presenter:* Peter R. Harris, College of William & Mary, Physics

Proteomics, the study of the proteins in your body, promises advances in disease detection and health diagnosis, all from a simple blood test. Proteomics uses Mass Spectrometry (MS) as its primary tool, but it needs improvements. Conventional Time Of Flight (TOF) MS sources rely on ion or laser bombardment for the ionization/desorption of molecules. When this process is applied to proteins, it often results in fragmentation of these molecules, effectively degrading the data. We are developing a novel MS source that uses laser generated acoustic shock waves to liberate ions from a liquid surface. The use of shock waves, a non thermal process, has the potential to be more gentle for the analysis of proteins, which tend to fragment in heat. We rely on the use of a unique class of chemicals, Room Temperature Ionic Liquids (RTIL), which are stable under extremely low pressures, making them suitable for use in vacuum and TOF-MS systems. In addition to potentially liberating fragile molecules without fragmentation, the ionization efficiency of our shock wave source will be enhanced by the ionic character of the RTIL. We also seek to develop RTIL Laser Induced Acoustic Desorption (LIAD) into a functional high repetition rate TOF-MS source that due to its self-healing, liquid nature, is not hindered by sample depletion effects. Along the way we hope to gain an understanding into the physical processes that govern acoustic ionization.

### Neurokinin Receptor-Expressing Neurons in the Neonatal Mouse PreBötzing Complex: Roles in Respiratory Rhythmogenesis

*Presenter:* John Hayes, College of William & Mary, Applied Science

Breathing in mammals depends on inspiratory-related neural activity generated in the preBötzing complex (preBötC), where neurokinin receptor-expressing neurons (NKR<sup>+</sup>) have been hypothesized to play a critical rhythmogenic role. Currently, the extent to which the preBötC is populated by rhythmogenic NKR<sup>+</sup> neurons, and whether neurons without neurokinin receptor expression (NKR<sup>-</sup>) share functional roles with NKR<sup>+</sup> neurons, are not well understood. These interrelated problems must be resolved to understand the widespread excitatory effects of neuropeptides and the mechanism of respiratory rhythmogenesis. We electrically recorded and imaged inspiratory neurons in neonatal mouse slices that isolate the preBötC and generate respiratory motor output in vitro. We show that 36% of inspiratory neurons with rhythmogenic-like phenotypic properties are NKR<sup>+</sup> and 64% are NKR<sup>-</sup>. Also, 67% of premotor-like inspiratory neurons are NKR<sup>+</sup> and 33% are NKR<sup>-</sup>. Thus NKR<sup>+</sup> and NKR<sup>-</sup> neurons exhibit the same phenotypic properties, which suggests that they may share functional roles too. The endogenous NKR agonist substance P (SP) evoked a voltage-insensitive inward current ( $I_{SP}$ ) that reversed at -19 mV and was associated with an increase in membrane conductance in both NKR<sup>+</sup> and NKR<sup>-</sup> neurons. Gap junctions are required for  $I_{SP}$  in NKR<sup>-</sup> neurons, which enables SP to exert ubiquitous excitatory effects even though NKR<sup>+</sup> neurons comprise less than half of the preBötC. We propose that cell death in NKR<sup>+</sup> preBötC neurons, by targeted lesion or neurodegeneration, may impair breathing behavior by killing less than half of the rhythmogenic preBötC neurons and a large number of respiratory premotoneurons.

### Political Legitimacy and the Party: Economic Growth as the New Communist Ideology

*Presenter:* April A. Herlevi, George Mason University, Public Policy

China's double-digit economic growth over the past twenty years has been truly astonishing. Moreover, the stability of the Chinese economy has become vitally important to not only China's over one billion citizens but also to its Asian neighbors and the entire international community. Paradoxically, it has been the Chinese Communist Party (CCP) who has been responsible for the capitalist makeover and opening of the economy. In order to understand the Chinese economic miracle it is critical to analyze how the CCP has accomplished this seemingly contradictory feat while still maintaining its political legitimacy. This research examines the current ideology of the CCP and the challenges that the Party faces. Initial research was completed using a variety of economic, political science and historical sources to understand the transformation of the Chinese economy. Following the literature review, the author conducted personal interviews, attended lectures by government officials and academics, and examined media sources in China. This phase of the research was completed in Beijing, Xian, Hefei, and Shanghai, China in June 2006. It appears that, thus far, the CCP's focus on economic performance has been and continues to be successful. However, despite many Chinese citizens tendency to be apolitical, there are some inherent challenges to basing the Party's ideology solely on economic growth. These vulnerabilities include the growing divide between rich and poor, the disparity between economic development in urban versus rural areas, energy security and environmental degradation. Each of these issues could potentially impact the political legitimacy of the CCP and should be examined further.



**Berenice Abbott and Elizabeth McCausland's "America. The 48 states."**

*Presenter:* Zach Hilpert, College of William & Mary, American Studies

My presentation will explore the documentary photography of Berenice Abbott, specifically her 1935 planned collaboration with art theorist and critic Elizabeth McCausland to build a portrait of America through images and words. The proposed cross-country journey, which never came to fruition due to a lack of willing funding sources, aimed to produce a book of photographs and journalistic writing titled, "America. The 48 states.," a manuscript intended to capture the essence of the country during the Depression. Though the project itself was never realized, Abbott shot a handful of preliminary photographs during self-funded trips, and she and McCausland produced a small but dense collection of documentation surrounding the proposed efforts. These illuminating documents, especially when placed in the context of prior and subsequent work that Abbott and McCausland produced, provide a rich text for exploring the view of America Abbott and her travel partner hoped to construct. Such a bold attempt to create a serious portrait of "America" says as much about these two important figures in the history of documentary photography as it does about the people and places that made their way in front of the photographer's lens. In this presentation, I will describe the nature of Abbott and McCausland's understanding of "America" as both an identifying concept and a physical place. This I will accomplish through an exploration of the documentation related to the America series that remains, including photographs, funding proposals, personal letters, unpublished essays, and other sources. Abbott and McCausland's work is particularly important as an early attempt by documentarists to photograph Depression-era destitution, and predates the publication of all other similarly themed Depression-era books.

**Energetics of an Adaptive Heat Stress Response in *Drosophila melanogaster***

*Presenter:* Luke A. Hoekstra, College of William & Mary, Biology

During times of stressful environmental conditions, homeostasis is compromised and energetic efficiency becomes increasingly important. The inability to respond to stress can restrict a species' geographical distribution, affect life history traits and reduce evolutionary fitness. Organisms must evolve resistant mechanisms to minimize the harm from environmental stress. These physiological or behavioral stress resistant mechanisms require metabolically costly processes and energy budgets must be managed to provide the necessary energy for a particular stress resistant strategy. An adaptive stress response then may involve altering metabolic costs to fit the particular needs of an environment. Environmental variation in temperature has received a great deal of attention due to the nearly universal need of organisms to cope with thermal stress, but the relationship between metabolic rate and thermotolerance remains poorly understood. This study addresses the central question: Is the modulation of metabolic rate part of an adaptive heat stress response? I will investigate this question by comparing the metabolic heat stress response of flies from populations of *Drosophila melanogaster* artificially selected for high and low heat tolerance. These selected populations with known differences in thermotolerance provide an excellent model for testing hypotheses about metabolic differences associated with stress resistance. Specifically, has selection for different modes of thermotolerance produced correlated differences in the metabolic response to temperature? Differences between selection lines in resting metabolic rate, or in metabolic rate during stress, may represent adaptive evolution of stress resistant mechanisms. I will present a metabolic profile of the heat stress response and attempt to clarify the mechanistic basis of thermotolerance in *Drosophila melanogaster*.

### **Lateralized Differences in Systolic Blood Pressure Regulation and Phoneme Detection as a Function of Hostility Level and Stress**

*Presenter:* Alissa Kate Holland, Virginia Tech University, Psychology

Differences in cerebral asymmetry were examined as a function of hostility in right-handed men. Systolic blood pressure (SBP) regulation and phoneme detection were measured before and after exposure to a recording of angry crying. Since increased SBP is associated with right hemisphere activation in high hostile men (Demaree & Harrison, 1997), it was predicted that in the left focus condition of dichotically presented stimuli, high hostile men would be unable to regulate SBP. Further, it was predicted that high hostile men would exhibit a relative increase in left-ear phoneme detection after exposure to the stressor. Six high hostile and 11 low hostile men participated in the study. Hostility classification was obtained using standardized scores on the Cook-Medley Hostility Scale (Cook & Medley, 1954). Right- and left-ear phoneme detection was tested by having participants identify 30 trials of phonemes presented to the left and right ear simultaneously. Participants then listened to a recording of infant vocalizations at 90 dB, followed by a second measure of phoneme identification. Systolic blood pressure was recorded before and after each exposure to the stressor. A group  $\times$  focus  $\times$  condition ( $F(2, 12) = 6.05, p < .05$ ) interaction indicated increased SBP for high hostile men in the no focus and focus left conditions. A hostile  $\times$  focus  $\times$  ear interaction ( $F(2, 30) = 3.33, p < .05$ ) was found, indicating a decline in asymmetry with respect to phoneme detection in high hostile but not low hostile men in the post stress condition. High hostile males appear to be inflexible at allocating lateralized intentional resources. Exposure to higher levels of affective stress may alter the ability to process speech. High hostile men also showed deregulation of SBP when they were required to use right hemisphere resources to detect phoneme at the left ear.

### **Water Quality in Headwater Streams: A Test of Best Management Practices**

*Presenter:* Jonathan W. Holley, College of William & Mary, Biology

Stormwater runoff carries many types of pollutants capable of having devastating impacts on the water quality of headwater streams. Impaired water quality affects both the diversity and abundance of aquatic organisms, and this is a common and well documented occurrence in urban areas. In response, stormwater management practices were developed to temporarily retain and treat runoff from urban areas before entering nearby streams. Among these best management practices (BMPs), stormwater retention ponds became the common solution to the runoff problem, and now these ponds are commonplace on all new development projects throughout Virginia. In James City County alone almost 500 retention ponds have been created for stormwater management. Stormwater management, however, has outpaced the science: the levels of water quality improvement associated with retention ponds are for the most part unknown. We plan to fill this knowledge gap by making detailed comparisons of the inflow to the outflow of retention ponds. We will also quantify the downstream impacts to aquatic macroinvertebrate communities in headwater streams.

### **Mate-Choice Copying in Female Zebra Finches, *Taeniopygia guttata***

*Presenter:* Amanda Houck, College of William & Mary, Biology

We are investigating the role of non-genetic processes in the inheritance of female preferences. In some species, females can copy the mate choice exhibited by others in the population, creating a mechanism of social inheritance (or "culture") of mate preferences. Such mate-choice copying (non-independent mate choice) is a possible mechanism through which an individual can use public information to select a mate. Demonstrating this mechanism is important because social inheritance of preferences may cause more intense sexual selection on male display traits. Recently, our lab has provided the first evidence of mate-choice copying in a monogamous species, the female zebra finch. Here, we further explore mate-choice copying in zebra finches and examine whether pre-existing mate preferences (for color bands worn by males) can be altered by public information.

### **Are Spiders the Missing Link? An Analysis of Mercury Contamination in Terrestrial Ecosystems**

*Presenter:* Mikaela Howie, College of William & Mary, Biology

Most studies on mercury contamination have focused on aquatic ecosystems and fish-eating organisms. This project is significant because it will focus on the risk of contamination by insectivorous songbirds living in terrestrial ecosystems. Recent studies by William and Mary graduate students suggest that mercury contamination can leave aquatic systems and travel through the food chain into adjacent terrestrial ecosystems. Mercury is a heavy metal that is detrimental to organisms when in high concentrations. Mercury is known to bioaccumulate, meaning that as more contaminated prey is eaten, mercury concentration increases within the predatory individual. Additionally, mercury biomagnifies as it travels up the food chain. Therefore, contaminated organisms at higher trophic levels, such as larger vertebrates, will have higher mercury concentration levels and be more susceptible to adverse effects. The overall goal of this project is to determine how insectivorous birds inhabiting riparian areas adjacent to a contaminated river are receiving high levels of mercury. By examining their foraging habits and prey items it will be possible to determine which avian species are at especially high risk of mercury exposure. Specifically, the project's hypothesis states that spider prey is crucial in the transfer of mercury because spiders are predatory and exist within an intermediate trophic level where they have a greater chance of mercury bioaccumulation and biomagnification. This project will also determine relative mercury levels in correlation with habitat type. Using Geographic Information Systems and collected data on avian mercury levels to create a map showing average mercury accumulation risk in relation to habitat type along the South River. This map will have a broad impact by informing conservationists of which species are at greater risk of mercury exposure and therefore where clean-up efforts should be focused.

### **Mutual Mate Choice and Sexual Selection on Females in Eastern Bluebirds, *Sialia sialis***

*Presenter:* Joanna Hubbard, College of William & Mary, Biology

The principle mechanisms of sexual selection are usually described in terms of female mate choice and male-male competition. However, sexual selection mechanisms should not be limited to this classical view. Eastern bluebirds (*Sialia sialis*) are socially monogamous birds demonstrate biparental care. Both sexes show among-individual variation in color patches (breast and rump) and quality. Therefore, it is likely that both sexes will be choosy as they are both investing more than just gametes into the offspring. I am investigating whether there is mutual mate choice occurring and sexual selection acting on females in eastern bluebirds. To determine this I will establish if there is a correlation between female color patches and various fitness metrics (body condition, date of first egg, clutch size, etc.). Additionally, I will perform mate choice trials to ascertain whether males choose more ornamented females. Results from these studies will allow me to assess whether mutual mate choice is occurring in eastern bluebirds and provide a test case for whether mutual mate choice should be expected in species with biparental care. Furthermore, these results will provide strong evidence for whether or not female color is under sexual selection. Therefore, the generalized results from these studies will help shape future sexual selection projects in organisms in which both sexes are investing in offspring and have the opportunity to be choosy.

### **The Rise of Free Jazz and Black Power Politics**

*Presenter:* Peter C. Jones, James Madison University, History

In 1960, Ornette Coleman released his seminal album, Free Jazz. It was an unprecedented leap forward in the musical development of Jazz. Coleman presaged a new group of talented musicians who were willing to break previous traditions musically and socially. Concurrently, figures like Malcolm X, Stokely Carmichael, and H. Rap Brown were changing the face of the civil rights movement. They advocated the formation of a specifically black nation. Leroi Jones, a poet, playwright, jazz critic, and civil rights leader was undergoing his own transformation. He would change his name to Amiri Baraka and help lead the Black Arts Movement. Avant Garde Jazz musicians were in a unique position to sympathize with the cultural nationalists because of their status as “colonized resource” and their movement towards African-oriented approaches. The Black Arts Movement and Cultural Nationalism came to a Zenith in the foundation of the Black Convention Movement and the 1970 victory of Kenneth Gibson as the first Black mayor of Newark. This paper will argue that the Avant Garde Jazz movement was a precursor to Black Power politics on a national scale and ran parallel to its meteoric rise in Newark and New York City.

### What's Going On in There? A Look Inside Jefferson Lab and the Nucleon

*Presenter:* Aidan M. Kelleher, College of William & Mary, Physics

Over 99% of all matter in the universe, including you and I, is made of protons and neutrons. They are not fundamental particles, but are made of smaller particles called quarks. A few miles away at the Thomas Jefferson National Accelerator Facility, research is being done to determine how these quarks make up the nucleons. Although we have known about quarks, protons, and neutrons for over 40 years, we still don't understand most of the properties of the protons and neutrons in terms of the quarks and the basic forces that comprise them. For example, what makes up the charge of the neutron? A neutron is electrically neutral, but the quarks inside are charged. How this charge is distributed in the neutron is the subject of a recent experiment at Jefferson Lab. This talk will give a brief introduction to the structure of matter as seen at Jefferson Lab. The talk will also reveal the inner workings of Jefferson Lab as seen through the author's experience in gathering data for his dissertation.

### Does Historical Exposure to Humans Affect Current Responses to Anthropogenic Disturbance? A Multispecies Comparison

*Presenter:* Caitlin Kight, College of William & Mary, Applied Science

Many studies have documented “real-time” adaptations of birds to the presence of humans; for instance, many species have altered migration timing and routes due to the availability of backyard bird feeders. To our knowledge, however, no disturbance studies have investigated such life history traits with respect to historical exposure to human disturbance. If greater historical experience in human-disturbed areas allows species to adapt to anthropogenic disturbance regimes, then the most historically-disturbed species will exhibit the fewest behavioral and fitness responses to current disturbance regimes. We investigated this hypothesis using Carolina chickadees (*Poecile carolinensis*), Eastern bluebirds (*Sialia sialis*), and house wrens (*Troglodytes aedon*). During the summers of 2005 and 2006, we quantified disturbance regimes, behavioral time budgets, and chick health metrics for each of these species across a disturbance regime. Although we await further data from our chickadee population, preliminary analyses indicate that house wrens (most historically disturbed) are least affected by anthropogenic disturbance, while bluebirds (moderately historically disturbed) show modest behavioral and fitness responses to disturbance. If our predictions are correct, and chickadees show the greatest reactions to human disturbances, this study would support our hypothesis that species could evolve over relatively short periods of time as a result of exposure to anthropogenic environments. Further, the results would show that even non-endangered species such as bluebirds, wrens, and chickadees, are constantly being exposed to pressures that could drive them to evolve from their “natural” condition to a more human-adapted life history. If this is the case, we will need to craft management plans that buffer wildlife from human disturbance at levels that cause adaptation and eventually evolution.

## **“No One Can Do It Better”: The Poetics of Race, Space, and Place in the Hip-Hop Album**

*Presenter:* Kevin Kosanovich, College of William & Mary, American Studies

‘No One Can Do It Better’: The Poetics of Race, Space, and Place in the Hip-Hop Album Scholarly examination of hip-hop has, justifiably, focused on issues concerning history, politics, locality, and identity. Subsumed within these disparate issues is sustained examination of the singular whole that holds these concepts together: the album. Always conscious of space, the hip-hop album’s tracks are replete with references of extreme locality (place) marking authenticity. By examining the structure of the album in concert with the historical importance of the album in popular culture, African American history and culture, hip-hop techniques of musical production, literary analysis, and cultural theory, the hip-hop album as a universal art form becomes apparent. After bringing these methods to bear on the album, codified structures become evident. Not only does the constant representing of place and space illustrate a larger pattern, but also the local signifying is revealed to have signifiers far beyond the local neighborhood or city. What is revealed is that the referencing of locales ultimately negates local meaning, and becomes a form of poetics shared by all practitioners of this art. As such, these poetics find their expression in the cultural commodity: the album bought, discussed and critiqued by critics and the public. The importance of these findings show that the hip-hop album is not a collection of singles pre-packaged for sale (although frequently marketed that way), but a conscious and deliberate placement of tracks following unique rules of the genre. This paper argues for hip-hop albums to be considered as viable an art form as any other popular music genre.

## **Public History and the Civil Rights Movement**

*Presenter:* Erin Krutko, College of William & Mary, American Studies

This paper will examine the narrative of the civil rights movement presented at museums and other public sites. The public memory of the black freedom struggle is contested and has been deployed continuously to either undermine or legitimize ongoing battles for civil rights and social justice. Consequently, the way the movement is remembered and its legacy is defined in the nation’s museums has significant consequences. In the last fifteen years, a number of southern cities have established large civil rights museums. The appearance of these institutions on the public landscape is one measure of increasing black political power and influence. However, the creation of these sites also has much to do with the demands of the tourism industry, urban redevelopment plans, and the emergence of the “entrepreneurial city.” Consequently, these institutions present the movement as a “won cause,” emphasizing national progress and triumph, while marginalizing some of our nation’s most enduring racial problems and concerns. These large publicly-funded museums do not have a monopoly on the public memory of the black freedom struggle. This paper will also examine alternative public sites of memory that preserve a more expansive vision of a long civil rights movement. A number of black schools that were closed in the South following integration have been reclaimed by their communities through preservation efforts and converted into local museums that archive the struggle for black equality. These institutions chronicle local civil rights struggles that lasted for decades. Moreover, their open-ended narratives and community service initiatives connect the struggles of the past to the present. This paper will compare and contrast the coalitions of interests which preserve and promote these different visions of the civil rights movement. I will ground my analysis through a discussion of specific museums and public history sites.

### **A Bayesian Classifier Used to Determine Disease Groups and Biomarkers in Blood Protein Samples**

*Presenter:* Karl Kuschner, College of William & Mary, Physics

A clinical trial may consist of only dozens, rather than hundreds, of independent samples. For blood protein mass spectroscopy studies, however, each of these samples produces thousands of data points. Even after “peak picking,” the result is still dozens of mass peak intensities for each sample. With the degrees of freedom on the same order of magnitude as the number of samples, it would be difficult to use many classifiers to parameterize the data space in order to divide the patients into disease and non-disease groups. The Bayesian classifier essentially “ignores” this high-dimensionality and instead uses a type of pattern recognition to classify new samples. The Bayesian classifier is given the output from automated peak picking routines developed by our group at William and Mary in cooperation with INCOGEN, a local bioinformatics company. For each patient sample, a peak intensity is given at each of many mass positions, along with a classification (disease or non-disease) for that sample. The Bayesian classifier “learns” from the study group, building a probability distribution table for the overall population as well as the disease groups. New samples are compared against that distribution and Bayes’ theorem is applied to determine the probability that a sample falls in a disease group given the data set produced. The result is a probability that a patient has the disease. A 2004 EVMS Leukemia clinical study of 500 spectra (including replicates) of leukemia and healthy patients was pre-processed by our group and the resulting peak data was the input to the Bayesian classifier. 147 patient samples, each with intensity values at 48 peak positions, comprised the initial data set. The Bayesian classifier was trained on the entire data set and then each patient was reclassified on the result. Several patient data sets were found to be highly misclassified (>90% confidence that they were in the wrong group) and were removed. Error rates as low as a few percent were achieved by repeatedly training on some large random sample of the population and testing the remainder. Removing peaks and repeating provided a methodology for finding the most “diagnostic” peaks. The Bayesian classifier proved to be an extraordinarily simple, fast, and flexible method of pattern recognition for disease classification.

### **Correction of Finite-Size Errors in Many-Body Electronic Structure**

*Presenter:* Hendra Kwee, College of William & Mary, Physics

Extended materials that are in everyday use, such as crystals, are comprised of a vast, essentially infinite, number of electrons and nuclei. Practical quantum mechanical calculations of their properties depend on reliably size-extrapolating the results of computer simulations on a relatively small number of particles. For the simplest quantum methods, such as density functional theory (DFT), this can be accurately done. However, the most accurate (in principle) methods have so far eluded a completely satisfactory treatment of these finite-size errors. I will present a promising new approach, which corrects the finite-size errors in the accurate quantum Monte Carlo (QMC) method. The approach is based on using specially tailored DFT calculations to obtain the needed finite-size corrections. Results will be presented for two test systems - the silicon crystal and a mathematically artificial crystal consisting of widely separated molecules. In both cases the size-corrected QMC results are in good agreement with experiment.

## John Rogers Cooke and the “Winning” of the Lost Cause

*Presenter:* Leonard Lanier, Virginia Tech University, History

For years after the Civil War, the struggle continued to hold the Southern psyche in a vise grip. Devoted ex-Confederates, like Jubal Early, turned Southern suffering into a powerful cultural force, the Lost Cause. Using the life of ex-Confederate John Rogers Cooke as a case study, my paper hopes to better illustrate the reconciliatory transformation of the Lost Cause in the 1880s. John Rogers Cooke played important roles both during and after the conflict. Son of Philip St. George Cooke and brother-in-law of Jeb Stuart, John Rogers Cooke served as a highly respected brigadier-general in the Confederate Army. After the war, Cooke became a Richmond businessman, with powerful connections to the Democratic Party. In the early 1880s, Cooke emerged within the veterans' and the Lost Cause movements as a moderate force for reconciliation with the North. Cooke and his cohorts, primarily former Virginia governor James Kemper, seized control of the Southern Historical Society from Jubal Early's hardliners, and openly pushed for a more moderate and reconciliatory tone. Cooke became the public face of this policy, using his leadership in veterans' groups to advocate for Blue-Gray reunions. No one can talk about the idea of reconciliation, especially in Virginia, without mentioning Cooke's name. Despite his importance, no major work on Cooke exists. By using John Rogers Cooke as a case study, this paper will add to the existing historiography by detailing the evolution of reconciliation within the Lost Cause and its connections to wider social and political trends within the post-bellum South.

## Do Birds Like McDonalds? How Diet Affects Bird Diversity in the Suburbs

*Presenter:* Elise Larsen, College of William & Mary, Biology

Many migratory bird species are declining in abundance. Habitat loss and fragmentation due to urban development is considered a main cause of these declines, and diversity of bird species generally declines with urban development. However, not all bird species respond similarly. Our research explores how bird species respond differently to urban development, depending on their food resources. We studied the relationship between bird diversity and urban development using spatial analyses of the U.S. Geological Survey's Breeding Bird Survey (BBS) and National Land Cover Data (NLCD) datasets for the Mid-Atlantic Coastal Plain. Urban development, estimated by impervious surface, was spatially related to breeding bird diversity, according to bird dietary groups. A mixed linear model of the spatial data identified the significant factors impacting breeding bird diversity. Preliminary results indicate that breeding diversity responded differently to urban development according to the birds' food resources. Insect-eating birds demonstrated the most negative response to urban sprawl, while birds with flexible diets demonstrated the most positive response. These results suggest that food resources may change with urbanization, with naturally occurring food resources becoming limiting resources for some bird populations, and anthropogenic food resources augmenting others. Ongoing work examines additional environmental parameters representing landscape composition, landscape structure, and human population density. In order to understand how continued urban development will impact bird populations, future research must examine urbanization impacts in terms of food webs and community interactions.



### **Lands of Beef and Tobacco: Herding and Modes of Production in British Colonial America**

*Presenter:* Dessa E. Lightfoot, College of William & Mary, Anthropology

Settlers in the early colonial period of New England and Virginia came from the same English agricultural roots and had the same models and tools for agricultural production when they arrived in the New World. Despite their similar backgrounds, each colony developed widely divergent agricultural and animal husbandry systems. By focusing specifically on cattle herding systems in colonial Virginia and New England in the first 100 years of English settlement, it is possible to illuminate the material differences in herding systems as being directly related to the modes of production employed in each colony. Herding systems can be regarded as modes of production because they dictate the relationships human populations have with their labor and with nature. How labor was organized was essential to how a colony adapted to their particular context; the conjunction of the economic goals of the settlers, the ecology, the population demographics, and how settlers were organized on the landscape went a long way to determining what strategies individuals would employ to meet their subsistence and economic goals. The modes of production employed in these two disparate regions will be explored to see what conclusions can be drawn to explain how settlers coming to the New World with the same supplies and agricultural models could end up with two vastly different systems in a few short generations. By understanding herding systems as a result of how labor was structured and deployed in the early colonial period, we can gain a better understanding of how colonists adapted to their new contexts, and the wide-reaching impacts labor organization and resource management had on colonial material culture, social organization and daily life.

### **“We, the Citizens...”: An Anthropological Study of Charles’ Corner, Virginia, 1862-1919**

*Presenter:* Shannon Mahoney, College of William & Mary, Anthropology

The half-century marked by the end of the Civil War and the beginning of World War I was a critical period of cultural, social and economic transition for African Americans in the southern United States. For rural communities in the South heavily reliant upon agriculture, such as a large portion of the Virginia population, post-bellum developments were particularly difficult due to an unstable economy, destruction of property and disruption of agricultural seasons. The transition from enslavement to freedom was rife with legal and social obstacles as well as economic hardship but experiences among the African American community were not universal. Charles’ Corner, a post-bellum community on the Lower Virginia Peninsula, provides a compelling case study for African American landholders during this period. For the purpose of this study, we ask what cultural processes instigated and maintained community life. We seek to recreate the history of the community through multiple lines of evidence including oral histories, documents, and artifacts. Through the application of anthropological theories on community building we can begin to examine cultural change brought about by the wants and needs of early post-Emancipation communities. By reexamining this time period, we also ask what implications this analysis may have for modern American society.

## Electric Field Gradient Trends in Perovskites

*Presenter:* Dandan Mao, College of William & Mary, Physics

Piezoelectric materials are technologically important due to their ability to transfer electronic energy to mechanical energy and vice versa. They have numerous industrial applications including SONAR, non-volatile memory, actuators, and transducers. Lead (Pb) containing compounds show the most superior performance to date. They have the  $\text{PbBO}_3$  perovskite structure, in which (ideally) the Pb atoms occupy the corners of the cube, the B atoms occupy the cube center, and the oxygen atoms are at the face centers forming an octahedron around the B atoms. The B sites can be occupied by more than one type of atom. Some Pb-based perovskites with a complex B site,  $\text{Pb}(\text{B}'\text{B}'')\text{O}_3$ , generally have the best piezoelectric properties. The physical properties of these perovskites are determined by the local ordering of the B atoms. One useful tool in probing the local environment at the atomic level is the electric field gradient (EFG), defined as the second derivative of the electrostatic potential at the nucleus. EFGs are sensitive to variations in local structure, and they can be measured using nuclear magnetic resonance (NMR). Calculations of EFGs are presented using first-principles methods, where no experimental input is required. We examine trends in B-site EFGs as a function of composition and order in  $\text{Pb}(\text{Zr}_{1-x}\text{Ti}_x)\text{O}_3$ ,  $\text{Pb}(\text{Sc}_{1/2}\text{Ta}_{1/2})\text{O}_3$ ,  $\text{Pb}(\text{Sc}_{2/3}\text{W}_{1/3})\text{O}_3$ , and  $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$ . Our results for  $\text{Pb}(\text{Zr}_{1-x}\text{Ti}_x)\text{O}_3$  are used to critically evaluate a structural model based on recent NMR measurements. Comparing EFGs across the different compounds, we observed several trends. Lower crystal symmetry yields larger B atom EFGs, and heavier, more polarizable B atoms tend to have larger EFGs. Furthermore, strong correlations are found between the B atom EFGs and their nearest surrounding B neighbor environment. These findings may help interpret ongoing NMR measurements in these materials.

[1] Supported by ONR.

## Open Source Community in Code Comments

*Presenter:* Stuart Mawler, Virginia Tech University, Science & Technology Studies

This paper takes a fresh look at software, treating it as a document, manuscript, corpus, or text, to be consumed among communities of programmers and uncovering the social roles of these texts within a specific open-source sub-community. In the paper, the social roles of the texts are placed within the context of the technical and cultural constraints and environments in which programs are written. Within that context, the comments emphasize the metaphoric status of programming languages and the social role of the comments themselves. These social roles are combined with the normative intentions for each comment, creating a dynamic relationship of form and function for both normative and identity-oriented purposes. The relationship of form and function is used as a unifying concept for a more detailed investigation of the construction of comments, specifically looking at a literary device that relies on the plural pronoun “we” as the subject. The comments used in this analysis are derived completely from within the source code of the Linux kernel.

### Longnose Gar (*Lepisosteus osseus*), an Apex Predator Within Virginia's Oligohaline and Tidal Freshwater Zones

*Presenter:* Patrick McGrath, Virginia Institute of Marine Science, Marine Science

Longnose gar (*Lepisosteus osseus*) is one of seven extant species within the family Lepisosteidae. It is a common predator residing in all of the major coastal rivers of Virginia extending from fresh to mesohaline waters. However, longnose gar remains one of the most understudied species, though it is one of the dominant piscivores in important marine and anadromous fishes' nursery zones. Their potential impact on local game fish populations and their prey items warrants further study of their life history and inclusion into ecosystem models. Longnose gar (n=122) were opportunistically collected in the tidal stretches of eight rivers in Virginia to examine diet preferences. Seventy-four longnose gar had items present in their stomachs and were found to be dominantly piscivorous. Mean percent abundance and weight were used to determine value of consumed prey. White perch was the most important prey item (51.1 %MN and 52.2 %MW) followed by Atlantic menhaden (24.5 %MN and 25.1%MW) and catfishes (7.0 %MW and 6.8 %MW). Juvenile fishes utilizing the estuary as a nursery were a large component of the diet. Percent abundance and weight were used to evaluate longnose gar's affect on local fish populations. The majority of longnose gar stomachs contained gamefish (64.2 %N and 75.7 %W), including white perch, striped bass, spot, Atlantic croaker, catfish, American shad, and weakfish. Menhaden was the most important prey in mesohaline water (73.8 %W and 75.0 %N), while white perch was the most important prey item in oligohaline and fresh-waters (77.5 %W and 22.2 %N). Longnose gar could have a negative impact on local menhaden populations, which in turn would negatively affect other fishes preying upon menhaden such as the economically valuable striped bass. This also stresses the need for ecosystem managements of Chesapeake Bay fisheries and longnose gar's inclusion into the ecosystem models.

### Reducing Yellowtail Flounder Bycatch: Modifying the Twine Top Configuration on Sea-Scallop Dredges

*Presenter:* Kelli A. Milleville, Virginia Institute of Marine Science, Marine Science

Atlantic sea scallops, *Placopecten magellanicus*, are harvested with dredges composed of a bag of linked, steel rings and a twine-mesh backing, called a twine top. Although the twine-top's primary functions are to reduce weight and aid gear-setting, it also facilitates escapement of non-targeted species and undersized scallops (bycatch), by creating exit openings larger than the rings' diameter. In some areas, yellowtail flounder, *Pleuronectes ferrugineus*, is captured as bycatch in sea-scallop dredges. To protect yellowtail flounder populations, attempts were made to reduce this bycatch through twine-top modifications. A single modification was applied to one of two dredges towed simultaneously during three trips aboard commercial scallop vessels. In all experiments, a 10-inch mesh was used. One experiment tested the effect of twine-top size on yellowtail flounder catch rates by decreasing the twine-top length from 8½ to 5½ meshes. The dredge containing the longer twine top showed consistently smaller yellowtail flounder bycatch (11/17 tows) and caught significantly fewer (p=0.019) yellowtail flounder overall (1,327 versus 1,583). In the second experiment, we tested the effect that hanging ratio had on yellowtail flounder catch rates. Defined as the ratio of meshes to connecting rings, this "hanging ratio" serves as a measure of mesh openness. Three hanging-ratio comparisons of were tested: 90/34 versus 60/34, 34/34 versus 60/34, and 68/34 versus 102/34. Results of these tests were mixed. Dredges with lower-ratio twine tops consistently caught fewer total yellowtail flounder, but only one comparison (90/34 versus 60/34) was significantly lower (p<0.05). The third comparison (68/34 versus 102/34) resulted in a greater number of tows (21/40 tows) where fewer yellowtail flounder were caught using the higher-ratio twine top. In conclusion, preliminary analysis indicates that dredges with larger mesh areas catch fewer yellowtail flounder, whereas attempts to reduce yellowtail flounder in scallop dredges with modified twine-top hanging ratios remain inconclusive.

### Does Prior Mating Experience Affect Subsequent Mate Preferences of Female Zebra Finches (*Taeniopygia guttata*)?

*Presenter:* Kelly Minton, College of William & Mary, Biology

The success of a mate choice can determine whether an individual has high or low fitness; therefore, it is important that individuals use information available to them to make the best choice possible. I propose to investigate mate preference plasticity of female zebra finches (*Taeniopygia guttata*) in response to mating experience. This will be accomplished by assessing leg band color preferences of virgin females in a mate preference chamber, allowing them to breed with either a male with leg bands they prefer or do not prefer, and then re-assessing preference. Female zebra finches have been shown previously to show preferences for males wearing certain leg band colors (most consistently, red) in past studies, and mate preference chambers have been previously shown to generate data that corresponds to real mate preferences. Zebra finches have also been shown to exhibit plastic preferences in other contexts; therefore, it is reasonable to expect to see it here. If I do find evidence of preference plasticity, this would suggest that mate preferences, and therefore the strength and direction of sexual selection, vary between life stages, and this would help to explain why variation in sexually-selected traits remains in wild populations.

### The Effect of Various Gas Species on the Field Emission Properties of Carbon Nanosheets

*Presenter:* Peter Miraldo, College of William & Mary, Physics

We have studied the impact of various gas species ( $H_2$ ,  $H_2O$ ,  $N_2$ ,  $O_2$ , and Ar) on the field emission properties of free standing, 1 nm thick graphene sheets, known as carbon nanosheets (CNS), grown on tantalum and silicon substrates via radio-frequency plasma-enhanced chemical vapor deposition. A precision leak valve was used to vary gas exposure from  $10^{-10}$  to  $10^{-5}$  torr while current-versus-voltage measurements were taken in an ultrahigh vacuum (UHV) environment. This fine control of the gas exposure meant that sub-monolayer to multiple monolayer coverage could be established on the CNS surface. A residual gas analyzer (RGA) was used to make partial pressure measurements of the gas under study and the gases already present in the vacuum system. The copper anode was heated to 150 °C prior to field emission measurements and cooled to 5 °C during field emission measurements in order to minimize the occurrence of outgassing events from the anode. The nanosheets were vacuum fired at 1000 °C prior to field emission measurements in order to remove absorbed hydrogen. The measured field emission properties were maximum achievable current, current stability and reproducibility, and lifetime performance.

## Roots, Rites, and Reconciliation: Chinese-Jamaican Cultural Performance and the Politics of Identity

*Presenter:* Chandra Montgomery, College of William & Mary, American Studies

This paper presents an examination of the particular ways in which Chinese-Jamaicans negotiate cultural and ethnic identity in the public sphere of performance-based artistic expression. My reference to the term or classification of Chinese-Jamaican constitutes a range of racial and/or ethnic combinations including third-, fourth- and fifth- generation Jamaicans of Chinese immigrant ancestry (specifically the Hakka peoples) and mixed-race or Afro-Chinese hybrids of varying proportions. Specifically, I argue in this paper that examples of popular performance by Chinese-Jamaican artists, namely reggae pop-music star siblings Tessanne and Tami Chin/Chynn and performance poet Staceyann Chin compellingly demonstrate a complexity of cultural identity that speaks to questions of authenticity, cultural essentialism, double-consciousness, transnationalism, and transculturalism. As these women “perform” their identity, the implications are social and political relative to the contentious historical contexts of “coolie” labor and oppositional tropes of Chinese and [Afro-] Caribbean femininity. Drawing primarily on the work of postcolonial scholars such as Brenda Edmondson, Natasha Barnes, and Shalini Puri, my reading of these cultural performances addresses the socio-political implications of the successes and failures of the Chin sisters and Staceyann Chin in Jamaica and abroad -- primarily in the US and Britain. In the context of postcolonial self-understanding and self-representation, the individual performances have a dual function as they represent both the individual artists and the nation. With respect to how these women have negotiated their roles in the public sphere and gained audience acceptance, I contend that the duality of the representative function of their cultural productions is also a manifestation of deeply imbedded colonial indoctrination. In addition, I am using an composite theoretical framework whereby postcolonial, race, gender, and cultural identity theories informed by the scholarship of Said, Spivak, Bhabha, Hall, Fanon, and Hannerz among others intersect to critically assess the cultural position of the three women at the center of my investigation in this paper.

## Chaotic Escape of Specularly Reflecting Particles from a Vase Shaped Cavity

*Presenter:* Jaison Novick, College of William & Mary, Physics

We study the escape of particles from a two dimensional, specularly reflecting open cavity having the shape of a vase. The narrowest point of the neck of the vase defines a dividing surface between particles that escape without return and those turned back into the cavity. This vase models a hydrogen atom placed in parallel electric and magnetic fields. Paths within the vase are qualitatively similar to those of ionizing electrons in the atomic system. Most importantly, the path a particle takes exhibits a sensitive dependence on the launch angle, a signature of a fractal structure or chaotic dynamics. Before presenting our results, we will discuss a few basic properties of fractals and give examples. Chaotic escape appears in a diverse range of systems so it's study is of importance. If constructed, the vase would have dimensions millions of times larger than those of an atomic system thus providing a more convenient method of studying chaotic escape. For our analysis, we consider a point source emitting a burst of particles in all directions and record the time to reach a detector forming the mouth of the vase. We find that this escape time, as a function of the launch angle, displays a fractal structure. Next, we briefly outline a topological theory that predicts a subset of the fractals seen in numerical simulations. Finally, we perform a numerical simulation and compare the simulated fractal to that predicted by the theory.

### **Cellular and Synaptic Mechanisms that Generate Breathing-Related Neuronal Bursts in preBötzinger Complex Neurons of Neonatal Mice**

*Presenter:* Ryland Pace, College of William & Mary, Applied Science

Respiratory neurons of the preBötzinger Complex (preBötC) form local excitatory networks and display 10-30 mV transient depolarizations with superimposed spiking during inspiration, i.e., inspiratory bursts. We examined the mechanisms linking excitatory synaptic inputs with recruitment of intrinsic membrane properties that promote burst generation. Persistent  $\text{Na}^+$  current ( $I_{\text{NaP}}$ ) primarily facilitated high-frequency intraburst spiking but did not contribute to the underlying envelope of depolarization, or drive potential. A  $\text{Ca}^{2+}$ -activated nonspecific cationic current ( $I_{\text{CAN}}$ ) was the dominant current underlying the drive potential.  $I_{\text{CAN}}$  was coupled to  $\text{Ca}^{2+}$  channels and type 5 metabotropic glutamate receptors (mGluR5s) via an inositol triphosphate ( $\text{IP}_3$ )-dependent mechanism. Inspiratory drive potentials depend on synaptic amplification mediated by  $I_{\text{CAN}}$ , a specialized intrinsic burst-generating current that is only fully evoked within a network coupled by ionotropic and metabotropic excitatory synapses in the context of behavior. These findings emphasize the importance of emergent network properties in respiratory rhythmogenesis.

### **The Effect of Birth Location on Non-Sequential Double Ionization**

*Presenter:* Jay Paquette, College of William & Mary, Physics

The development of high intensity lasers has resulted in several interesting discoveries in atomic physics, including non-sequential double ionization (NSDI). In NSDI, an electron tunnels quantum mechanically out of an atom and into the continuum. Once in the continuum, the electron is solely under the influence of the laser field, which may drive the electron back to its parent ion, at which time an inelastic collision occurs that may release a second electron. This 'return trajectory' is determined by the longitudinal component of the electric field of the laser, whose magnitude varies throughout the focal volume. Since double ionization is dependent on return trajectories, variations in the longitudinal field will affect the ionization yields. We will compute and analyze the trajectories of electrons from different birth location and connect these trajectories to predictions of ionization yields.

### Calculations of Nuclear Magnetic Resonance Properties in Alloy Piezoelectric Solids

*Presenter:* Daniel L. Pechkis, College of William & Mary, Physics

Piezoelectric materials have the ability to interconvert mechanical and electrical energy. This property has made them ideal for use in everything from automobiles to medical technologies. Even though you can find them in all walks of life, there are still some unanswered questions to the origins of this electro-mechanical coupling. A crucial area of research in the design of these materials concerns how local atomic structure relates to piezoelectric properties. For example, B-site alloys with the perovskite structure  $ABO_3$  such as  $Pb(Zr,Ti)O_3$  (PZT) and  $Pb(Mg,Nb)O_3$  (PMN) have extremely different piezoelectric characteristics. Piezoelectric properties are related to the material's local crystal structure and chemical (dis)order. Nuclear magnetic resonance (NMR) has been shown to be a sensitive experimental probe of the local structure, but measurements are often difficult to interpret. First principles computational studies of these materials can clarify the experimental analysis. I will discuss my approach to performing these calculations and present my most recent results.

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### Fashioning the Black Self During the New Negro Movement

*Presenter:* Roxane Pickens, College of William & Mary, American Studies

The process of dressing up or down is not only an opportunity for a person to make statements about him or herself to others; the manipulation of fashion significantly allows a person to communicate certain ideas directly to oneself. How this process has played out for African Americans is the theme of this paper. Through the system of slavery, black people were routinely degraded with, among many other things, poor clothing. The ability of African Americans to reject their meager dress--if only for one day out of the week--meant that they could consciously reject a position of servility and oppression. This situation became even more crucial after Emancipation and during the era of Jim Crow. Given the repeated portrayal of black people in early twentieth century visual culture as cartoonish, grotesque and poorly clad, it became important to challenge these images on a variety of levels. The benefit was two fold: both society's image of African Americans and their images of themselves could be rendered in a more positive light. By the 1920s, New York's Harlem was the stage upon which new identities for African Americans would be crafted. The New Negro artists of the Harlem Renaissance re-imagined colored selves variably through writing, artwork, music, and performance. This paper looks at the ways they considered and portrayed notions of the black identity through the adornment of the black body. Through clothing, furniture, and gesture, writers like Jessie Fauset, Claude McKay, Zora Neale Hurston, and photographer James Van DerZee considered how the black body could be adorned and degraded, or stripped and celebrated. Rather than being merely superficial descriptive elements in their work, the inclusion and discussion of accoutrement by New Negro artists marked their understanding of and ambivalence toward the importance of appearance and self-awareness within the black community.

### History, Memory, and Trauma in Edward P. Jones's *'The Known World'*

*Presenter:* Brian Piper, College of William & Mary, American Studies

Since roughly the 1960s, American authors have been writing novels that explicitly engage with memories of slavery from the distance of several generations. Commonly bundled under the genre of neo-slave narratives, these texts claim an authority to narrate the slave experience in ways that traditional histories cannot, while broadening our thinking about ways that we can effectively represent the traumatic past. Edward P. Jones's novel *The Known World* (2003) builds upon that literary legacy in order to break down hierarchies of history, myth, and memory. He affects a stance of historical authority in order to poke holes in the notion of historical fact itself, encouraging the reader to question accepted master narratives. Employing a nonlinear narrative form, Jones further establishes a sense of disruption in the reader that evokes a struggle to reconstruct memories both distant and tragic. By applying some of the basic tenets of trauma theory to *The Known World*, this paper argues that in form and content Jones's novel replicates a dynamic of ruptured narratives common to trauma survivors while offering strategies for more vividly representing the interiority of slavery. *The Known World* asks the reader to consider how the traumas of slavery disrupt notions of identity and history and make traditional narrative strategies inadequate. While Jones illustrates specific characters' attempts to cope with their experiences of enslavement he also points to the difficulties in recovering and/or representing the traumatic past. To that end, Jones's narrative form replicates a fragmentation of memory, positioning the novel as both problematizing and intervening with the slave narrative tradition.

### Avoiding Liability Through Self-Regulation: A Case Study

*Presenter:* Michelle R. Ranville, George Mason University, Public Policy

A number of trade associations, testing laboratories, and professional organizations in the United States set standards that direct or regulate their respective industries. A brief review of self-regulation reveals that many of these organizations are the sole authority in a given policy area and that Congress and federal agencies informally permit, if not expect, them to make decisions in their areas of expertise. This paper focuses on one standard-setting organization, the American Correctional Association. There are no federal standards or policies directing prison operations in the United States. Over the past thirty years, twenty-three state correctional departments have taken measures to upgrade and improve prison operations in order to meet standards set by the ACA. Why do states voluntarily adhere to standards that require costly facility improvements, maintenance, and additional personnel? A number of authors have suggested that self-regulation is deemed an effective mechanism for decreasing or avoiding legal liability. Qualitative interviewing of corrections professionals confirms the belief that adherence to uniform standards is a way to avoid lawsuits over constitutionality of confinement. The implications of self-regulation in a democratic society are discussed.



### Parents and Disability in Ladakh, India: Coping, Cure-seeking, and Awareness

*Presenter:* Bonnie Richard, George Washington University, Anthropology

This paper presents Ladakhi parents' explanatory models of their children's disabilities. I focus on how parent's explanations influence the cure-seeking process, the implications of lacking a diagnosis, and NGOs' recent impact on the situation. In Ladakh, India, in the western Himalayas, parents and caretakers of disabled children face many challenges. My ethnographic research included interviews with parents, NGOs, educators, and therapists, as well as participant observation in homes of disabled children and in educational facilities, with the goal of understanding how parents approach, explain, and deal with disability, society, and their disabled child. Social attitudes toward disabled people in Ladakh vary, ranging from theories of karmic causation, to viewing disabled people as contagious, to general social acceptance. Ladakhi people rarely voice negative attitudes about disability publicly, but parents often do feel shamed or stigmatized. Parents of disabled children focus less on obtaining a diagnosis for their child than a cure. They view their child as simply sick, and hope to find a cure among traditional herbalists, religious, and biomedical practitioners. Parents usually do not view the child's disorder through the framework of biomedicine, and have limited knowledge of the role of biological maturation in shaping their child's future, or of the various types of biomedical therapies available in other parts of India that could improve the child's condition. Even those who do obtain information on biomedical therapies do not generally have the wherewithal to access to these relevant facilities and programs. The work of non-profits has enabled some disabled children attend mainstream public schools, and provided free physical therapy to a few children. However, children with severe disabilities still lack access to education, while parents have become more aware that help is available, yet beyond their reach.

### Resonance Crossing and the Breakdown of WKB

*Presenter:* Steve Richardson, College of William & Mary, Physics

We review the problem of two coupled harmonic oscillators with slowly varying frequencies as a simple example of resonance crossing. For an interval of time when the two frequencies are nearly equal, energy can be transferred from one to the other. This is an example of a very general phenomenon in physics: the breakdown of adiabaticity by resonant interactions, and it is called different names in different contexts: "Landau-Zener crossings", "avoided crossings", "mode conversion", etc. In this poster, we provide a brief pedagogic review of how to solve this simple time dependent problem using matched asymptotic expansions. We then describe how the same problem can be solved in phase space using a canonical transformation and the associated metaplectic transformation. The advantage of phase space methods is that they can be extended to problems in higher dimensions and more complex geometries. Additionally, the Wigner tensor of the solution can be computed as a function on phase space. This function can give insight into the behavior of the system, and could be a useful tool for investigations into coherent interactions and the effects of noise in the system.

### **Sarah Logan's Peaches: Setting a Place for Food in Material Culture Studies and the History of Colonial North America**

*Presenter:* Catharine Dann Roeber, College of William & Mary, History

In the mid-1700s Sarah Logan sent a jar of preserved peaches to her relatives in England. The gift allowed her to share products of North American soil and sensory pleasures such as Pennsylvania peaches with friends and family abroad as well as declare her identity within the household, the colony and in transatlantic networks of exchange. In this paper I will explore how food, the most ephemeral of objects, can provide a powerful glimpse into social relations and material life in colonial America. Food is an excellent tracking device for identifying relations between various members of the extended colonial household, including family, slaves, servants, wage workers, friends and business associates. While everyone ate, the practices of food procurement, distribution and consumption were often conflicted and complex processes. Sharing food such as peaches could strengthen social bonds and networks of exchange. Yet food could also be used to reinforce social barriers, manipulate, or assert power. Food, and the objects associated with preparation, presentation and dining are often framed in discussions of consumerism and gentility. But this assumes that food functions primarily as an economic good or a means of achieving status. My goal is to place food and the objects associated with food in a broader context of personal and group identity-fashioning, the creation and perpetuation of social networks, and the processes of reciprocity and gift exchange. In this paper, I will map spaces where food preparation, presentation, and dining occurred within colonial households and identify the actors involved in the processes of "food-actions." Sources will include extant objects and spaces associated with food production, presentation and consumption as well as documentary evidence such as inventories, receipts, letters, and recipes from families and their estates in the Delaware Valley before 1760. The growing field of culinary and foodways history is rich with meaning and ripe for analysis. Informed by approaches from anthropology, geography, history and material culture, this study of Sarah Logan's peaches can highlight the dynamic relations between objects, spaces, and people and highlight the importance of food to the study of early colonial life.

### **Homosexuals and the U.S. Military: The Impact of "Don't Ask, Don't Tell" on DOD Critical Language Capabilities**

*Presenter:* Jill A. Rough, George Mason University, Public Policy

The operational environment the military faces today has prompted many to question the Department of Defense's (DOD) ban on homosexuals in the military. Opponents of the current policy contend that it unnecessarily wastes much-needed human capital from the all-volunteer military force. This argument gained national attention in 2003 after DOD discharged 37 gay linguist students from the Defense Language Institute in Monterey, California. Given the shortage of servicemembers with language skills, the question of whether the military could afford to lose individuals with such critical skills arose. This paper examines whether the ban on homosexuals is disproportionately impacting DOD's foreign language capabilities. Using inferential analysis, the study explores the current state of DOD foreign language capabilities and the number, experience and proficiency levels of those servicemembers discharged for homosexuality in the past 10 years. The study concludes that despite significant DOD shortfalls in meeting language requirements, the majority of servicemembers with language skills who have been discharged for homosexuality has been inexperienced and not highly proficient in the language studied. While the data and analysis is not sufficient to support the hypothesis, the paper also suggests that existing methods to measure the impact on capability of the loss of a junior linguist is not sufficient. The study presents language aptitude as an additional measure DOD should consider when quantifying the loss of personnel with critical language skills. As the military continues to weigh the costs and benefits of continuing the ban on homosexuals, it is critical that DOD realize that the loss of a servicemember with limited experience or limited proficiency -- but high aptitude -- will affect its foreign language capabilities and is a vital component of strategic workforce planning.

## Historical Archaeology in Nombre de Dios

*Presenter:* Maria F. Salamanca, College of William & Mary, Anthropology

I will present the preliminary results of my dissertation research, which focuses on the study of social relations through the analysis of material culture from the sixteenth-century port of Nombre de Dios, Panama. This city was an important port in the New World during the sixteenth century because it was one of only three ports used by the Spanish Empire to send goods to America. In turn, the gold and silver extracted from South America passed through this port en route to Spain. The context of Nombre de Dios created unique circumstances: the presence of different groups –Europeans, Indians and Africans – with multiple identities; continual population flux; and strong influence of European goods and people. Although broad historical studies exist related to the port's economic significance, none give major details about the life of its permanent population, which is the focus of this project. My project examines social relations through the analysis of space, ceramics, and objects of personal use. The analysis of material remains provides information, not only about the physical structure of the town, but also about its sixteenth-century inhabitants and their relationships with one other. It is possible to discover the extent to which the cultural encounters between groups and the adjustment to the New World conditions affected pre-existing identities through the interpretation of archaeological remains. Furthermore, archaeological investigations at Nombre de Dios may reveal how the continual influence from Spain and other European colonies affected the formation of new identities, the use of objects considered as ethnic markers, as well as how ethnic origin and social class played a role in the formation of new identities. This presentation complements another session titled "Community Engagement and Public Education Toward Archaeological Preservation in Nombre de Dios, Panama," and related poster "Community Engagement Toward Archaeological Preservation."

## Community Engagement Toward Archaeological Preservation

*Presenter:* Maria F. Salamanca, College of William & Mary, Anthropology

This poster will present the historical archaeological project of Nombre de Dios, a 16th-century Spanish port city, as a backdrop to the community engagement portion of the project. Research team members met with and conducted workshops with community members to provide them greater informational access to their archaeological heritage and towards instilling in them a greater sense of responsibility for its preservation. This poster will capture the excavation and public outreach aspects of the project, and presenters will be on hand to describe it more fully and answer questions. The poster complements two talk sessions, "Historical Archaeology in Nombre de Dios" and "Community Engagement and Public Education Toward Archaeological Preservation in Nombre de Dios, Panama."

### **A Computational Study of the Electron Potential of Ruthenium Pro-Drugs**

*Presenter:* Jennifer Sanderson, Old Dominion University, Chemistry & Biochemistry

Ruthenium pro-drugs are among recent metal-based compounds that exhibit anti-tumor behavior. Cisplatin is an effective anti-tumor drug, but is highly toxic to the biological system. Ruthenium-based compounds are of interest because they are less toxic than cisplatin while acting by a similar mechanism. Ruthenium complexes are administered in the 3+ oxidation state, as Ruthenium (III) has strong electrostatic interactions with its ligands, which makes it inert. In a hypoxic environment, such as tumor cells, ruthenium (III) is reduced to ruthenium (II). Ruthenium (II) has weak electrostatic interactions with its ligands, resulting in the dissociation of one of the ligands. The ruthenium center then has a free site to coordinate with guanine residue at the N7 atom in a similar way as cisplatin, which results in apoptosis. DFT calculations will be performed on several ruthenium compounds to calculate the reduction potential and determine the effect of ligands on the reduction of ruthenium compounds. The ligands coordinated with ruthenium will determine the reduction potential required to reduce ruthenium (III) to ruthenium (II). From this study, we hope to determine how different ligands affect the overall potential of the compound and propose new compounds that will be effective anti-tumor pro-drugs.

### **The Structure of the Spectrum of the Hydrogen Atom in Crossed Electric and Magnetic Fields**

*Presenter:* Chris Schleif, College of William & Mary, Physics

We study the hydrogen atom in perpendicular and near-perpendicular electric and magnetic fields using quantum and classical perturbation theories. We find that the energy levels of the quantum states are organized into a structure which is explained by classical mechanics. We demonstrate how this structure may be observed by constructing a particular lattice of quantum expectation values. For certain ranges of electric and magnetic field strengths and orientations these lattices contain defects connected with a property of classical mechanics called monodromy. If a classical system has monodromy then there is a classical action which is an intrinsically multivalued function of the constants of the motion. Monodromy had been predicted to be present for perpendicular fields by Sadowskii and Cushman. We have shown that the presence of monodromy, signaled by the presence of these lattice defects, persists in near-perpendicular fields. We have found that such defects undergo a series of bifurcations when the fields are tilted from perpendicular. We have used predictions made by classical mechanics to map out all lattice structure in near perpendicular fields and we show that these agree with quantum calculations.

### **A Synthetic Pathway to Afford 2,6-Disubstituted Dihydropyrans Via a $\text{BiBr}_3$ Initiated Three Component One Pot Reaction**

*Presenter:* Kristie Schmidt, College of William & Mary, Chemistry

The three component one pot reaction is a useful way to synthesize 2,6-disubstituted dihydropyrans in good yield and good diastereoselectivities.  $\text{BiBr}_3$  is a practical Lewis acid as it has low toxicity, is inexpensive, and is used in catalytic amounts to initiate the sequence of reactions. The reactions in one vessel allow for the efficient addition of different substituents located at the 2- and 6- positions on the dihydropyran. The reaction sequence is started by making (Z)-4-(trimethylsilyl)but-3-enal which is then reacted with a ketene silyl acetal or an enol-ether to give a  $\beta$ -trimethylsilyloxy vinyltrimethylsilane intermediate. Another aldehyde is then added to the reaction vessel and the silyl-prins cyclization occurs to make the final 2,6 disubstituted product. This reaction pathway is important because it allows for a quick and easy way to synthesize these compounds that can be found as subunits in many biological natural products.

### **Screening the Revolution: Williamsburg: *The Story of a Patriot* as History Film, Historic Artifact, and Hegemonic Struggle**

*Presenter:* Jenna Simpson, College of William & Mary, American Studies

Williamsburg: *The Story of a Patriot*, Colonial Williamsburg's visitor orientation film, debuted in the spring of 1957. Though it was originally intended for only a few years' exhibition, it has been playing continuously ever since, making it the nation's longest-running movie. This talk questions the implications of such longevity, examining *The Story of a Patriot* as a historic artifact, history film, and site of struggle over the meaning of the past. As a historic artifact, *The Story of a Patriot* is a useful window onto the late 1950s as it reflects the attitudes within Colonial Williamsburg and in American society at the time. In both the film itself and in the documents surrounding its creation, we see struggles over communism, individualism, conformity, and race. As the decades have passed, audiences have brought new attitudes and expectations to the film. These changes have seriously impacted the film's effect and its ability to teach history. Nevertheless, Colonial Williamsburg continues to utilize *The Story of a Patriot* in their visitor center, and several million dollars have been spent in recent years to digitally restore the film to its former "glory." What does this reveal about current conceptions of the "good" history film, the interpretation of the past, and the way we relate to history on the screen?

### **Sociometer Theory Expanded: Interpersonal Aspirations and the Specificity of Multiple Sociometers**

*Presenter:* Shereen A. Singer, College of William & Mary, Psychology

An essential need all humans must fulfill is the need to belong. Leary and Baumeister's suggest that self-esteem is a sociometer that acts as a gauge of people's levels of social belongingness. Thus, low self-esteem alerts us to deficits in belonging. Kirkpatrick and Ellis (2001) suggested that the sociometer guides interpersonal aspirations, such that acceptance leads to increased self-esteem and higher future aspirations, and rejection leads to decreased self-esteem and lower future aspirations. It has been proposed that there are multiple domain specific sociometers for different types of relationships including family, friends, and mating relationships. This study looked at how self-esteem and interpersonal aspirations are affected by different types of feedback, and whether there is a domain-specific sociometer for friendships and mating relationships. Participants (N = 101) were given either false acceptance or rejection feedback by male or female raters. They were then asked to rate four targets, two men and two women. The physical and social attractiveness of the targets was manipulated so one target of each gender was highly desirable and one target of each gender was less desirable. Ratings of same-sex and other-sex targets were analyzed in comparison to false feedback given to participants. Results showed that participants who were accepted consistently rated the highly attractive targets more positively than participants who were rejected. Participants who were rejected felt less compatible with the highly attractive targets. These aspiration effects were completely mediated by state self-esteem, suggesting that the sociometer does indeed guide interpersonal aspirations. Results suggest possible multiple sociometers, but future research needs to further clarify these findings. This study has great implications for people's social interactions and should spur future research in the area of self-esteem and interpersonal aspirations.

### **Community Engagement and Public Education Toward Archaeological Preservation in Nombre de Dios, Panama**

*Presenter:* Meghan Habas Siudzinski, College of William & Mary, Anthropology

This session focuses on the community engagement and public outreach program within a larger archaeological investigation of Nombre de Dios, Panama, a 16th-century Spanish port in the New World. The port city was abandoned in 1597 by the Spanish residents, but at a later point was repopulated by African descendents. Due to extreme poverty of the current residents and negligence on the part of governmental authorities to protect the archaeological site, illegal looting by residents in the past year has threatened the integrity of the 16th-century archaeological remains. Developed as the focus of my Master's thesis research, this project aims to partner with town residents (who total approximately 500) to develop strategies for economic development that also preserve the archaeological heritage. I am also investigating identity and heritage construction of the residents, who are African diasporans, but who self-identify as Spanish descendents. This presentation will describe residents' identity construction and attitudes toward their archaeological heritage. I will also discuss the educational strategies used to address archaeological preservation with adults and children, and how these impacted resident attitudes and behaviors in Nombre de Dios. Finally, this project is informed by, and compared to, the strategies used by the Old Panama Foundation, Panama City, Panama to address similar concerns.

### **Development of an Enzyme-Linked Immunosorbent Assay (ELISA) for the Detection of Water-Soluble Thiophenes**

*Presenter:* Candace R. Spier, Virginia Institute of Marine Science, Marine Science

Cumulatively and individually, the components of petroleum released into the environment can pose a range of environmental risks. Current environmental assessment involves analytical methods, which are time-consuming and expensive. Immunoassays represent an attractive alternative if suitable sensitivity and selectivity can be achieved. They hold promise for use in real-time assay systems which would improve the reliability of establishing the sources, loads and fates of petroleum in the marine environment. Polycyclic aromatic sulfur heterocycles, such as alkylated thiophenes, benzothiophenes and dibenzothiophenes, are present in crude and refined petroleum, as well as, in the water-soluble fraction of released petroleum and therefore represent attractive targets for monitoring. Although little studied, they appear as toxic as their hydrocarbon analogs. Previously, antibodies, the backbone of immunoassays, have been employed for the detection of metal ions, trinitrotoluene, benzo[a]pyrene, and pesticides. In the present study, antibodies have been produced for several thiophenes and their sensitivity and selectivity have been examined by enzyme-linked immunosorbent assay. Future work will involve the production of monoclonal antibodies with optimal characteristics for analytical use and development of a real-time analytical system.

### **The Effects of Financial Incentive in Medicaid Managed Care Plans on Physicians' Practices**

*Presenter:* Lekhena Sros, University of South Carolina, Health Services Policy & Management

This study investigates the impacts of financial incentive in managed care plans on physicians who are delivering care to Medicaid managed care enrollees. This study uses the data from Community Tracking Study Physician Survey, 2004-2005. The physicians' practices are measured in term of time spent with the patients, the degree of freedom in clinical decisions and their satisfaction with the patients. The effects of number patients visits in office, number patient in outpatient clinic, number patient visits in nursing home, number of patient visits at hospital, type of group physician practices and their specialty categories are controlled. There is no significant association between financial incentive and time spent with patients as well as freedom in clinical decisions, but financial incentive are positively significantly affect physicians' satisfactions. Financial incentive does not influence their time spent on patients and their freedom for clinical decision. However, those who receive financial incentive are likely to be satisfied with their practices. Increasing financial incentive in Medicaid managed care plan could lead to high quality of care for this population.

**Characterization of a Combined CARS**

*Presenter:* Sarah Tedder, College of William & Mary, Physics

Time-resolved measurements are desirable to investigate unsteady and turbulent flows. Non-intrusive multi-property optical methods can be applied to high-speed flows and combustion experiments using Dual-Pump Coherent anti-Stokes Raman Spectroscopy (CARS) for temperature and species mole fraction and Rayleigh scattering for temperature, density, and velocity. These measurements serve as good test cases for evaluating or developing computational fluid dynamics (CFD) codes. When multiple flow properties are measured simultaneously, correlations can be used to obtain a deeper understanding of combusting and turbulence flows. This presentation describes the physics of the combined CARS and Interferometric Rayleigh Scattering (CARS-IRS) system and its capability to provide time-resolved simultaneous measurement of temperature, species concentration, and multiple components of velocity in gaseous media. Also, included in the presentation will be a description of the system which uses green injection seeded Nd:YAG laser, a narrow-band yellow dye laser, and a spectrally broad red laser.

**The Moral Emotion of Disgust as a Predictor of Prejudicial Attitudes Toward Homosexuals**

*Presenter:* John Terrizzi, Jr., College of William & Mary, Psychology

Jonathan Haidt (2001) proposed a model of moral reasoning which suggests that individuals make their moral judgments based on automatic emotional responses and provide post hoc rationalizations to explain their moral positions. One of these "moral emotions" is disgust sensitivity. The purpose of this study is to examine whether disgust sensitive is predictive of prejudicial attitudes toward homosexuality. Participants were 150 male and female introductory psychology students from the College of William and Mary. They completed a battery of examines including the disgust sensitivity scale, right-wing authoritarianism (RWA) scale, and a scale to measure prejudicial attitudes toward homosexuals. Participants will also complete the defining issues test to assess their level of moral development. Preliminary results indicate that disgust sensitivity is predictive of prejudicial attitudes toward homosexuals. However, when RWA is controlled for, the relationship becomes nonsignificant.



## On Molecular Capsules Obtained From Calix[4]resorcinarene

*Presenter:* Onome Ugono, Georgetown University, Chemistry

The efficient synthesis of so called molecular containers remains a topical issue in modern organic chemistry. In particular, molecular encapsulation phenomena and the remarkable properties and behaviors that are observed in these systems have been of great interest in recent chemical literature. Potential applications of these systems include sensing, stabilization of reactive intermediates and nano-sized reaction chambers among others. This talk would describe a hexameric assembly derived from six calix[4]resorcinarenes, two waters and six ( $\pm$ )-2-ethylhexanol molecules. This assembly is mediated by sixty hydrogen bonds and encompasses an accessible volume of  $1.4\text{nm}^3$ . We have demonstrated the ability of this assembly to maintain its structure in solution and that it encapsulates guest molecules within this well defined cavity via  $^1\text{H}$ NMR. Further details of the spontaneous assembly of this hexamer in solution will be presented.

## Detection of Problem Solving Abilities Through Adaptive Questioning

*Presenter:* Jorge Vasconcelos, Johns Hopkins University, Computer Science

An action research study to develop an adaptive-questioning model for screening fundamental problem solving abilities is presented. It has been driven by the need to understand what tends to prevent students from acquiring the problem-solving skills needed for creating computer programs, and was performed under the assumption that a big number of instructional challenges within the programming sequence are due to factors indirectly related with coursework and which mastery precedes the introductory programming level, like reading, arithmetic, or algebraic abilities. The work is grounded on a constructivist theoretical framework and has followed an innovative and dynamic approach to integrate common programming pitfalls, programming-related thinking styles and problem solving ability domains. The creation and implementation of a complex array relating ability domains, thinking styles and common errors, as well as the design of qualitative techniques for adaptive testing were the main challenges of the study. The final product, an adaptive-questioning prototype, will be used to start benchmarking problem-solving skills essential in effective learning of computer programming. The resulting software, and its supporting methodological framework, are aimed to provide programming instructors with information and resources to accommodate instruction to different levels of problem-solving abilities, and help college students overcome learning challenges while gaining a deeper understanding of the knowledge, abilities and cognitive processes needed to become skillful in creating algorithms and elaborate computer programs. This study has sought to attend the imperious social need for people fluent with information technologies by increasing the number of programming students acquiring successfully the problem solving and programming skills required in modern computing.

## **An Exploratory Study on the Cognitive Skills Involved in Computer Programming**

*Presenter:* Jorge Vasconcelos, Johns Hopkins University, Computer Science

Many difficulties students face during programming courses are due to factors whose mastery precedes the programming level like communication skills or arithmetic and algebraic abilities. Consequently, we have been studying what knowledge and skills students have when starting such courses, as well as their instructional impact. We believe that without having first some understanding about cognitive pre-requisites for computer programming, we will not be able to solve problems arising during courses. We have surveyed algorithmic problem-solving skills at the beginning of programming courses. The instrument designed regards five ability domains involved in classic problem-solving: reading comprehension, problem abstraction, algebraic manipulation, strategy planning, and process analysis. Study of most common pitfalls led to propose the following taxonomy of cognitive skills (i.e., intellectual abilities allowing students to get involved with the instruction process). Detail oriented thinking: Detect and keep track of details throughout the problem solving process. Logical thinking: Identify, visualize and integrate cause-effect situations. Language management: Read and understand information, ideas and all words presented in writing (problem statements and mathematical word problems.) "Abstract" thinking: Make and recognize generalizations, with either words or symbols. "Black box" thinking: Identify, visualize and handle "black-box" situations without making assumptions or requiring knowledge of the process transforming inputs into outputs. Arithmetic skills: Perform basic arithmetic operations with either numbers or symbols. "Big picture" thinking: Integrate diverse elements and visualize them as a whole entity. "State machine" thinking: Visualize and understand any sequence of instructions as several pair-wise causal interrelated steps, without losing track of variables or adding assumptions.

## **A Cultural Perspective of Algorithmic Thinking**

*Presenter:* Jorge Vasconcelos, Johns Hopkins University, Computer Science

Algorithmic thinking is a style of work and thinking acquired after continuous and systematic to design and evaluate algorithms to solve problems. The activity requires deep understanding of the process underlying each situation and the ability to express it as a sequence of logically ordered steps. This lecture presents the cultural legacy involved in algorithmics, and therefore in information technologies, and how algorithmic principles can be found and applied outside the realm of computer science. . Topics to be discussed are: (i) the idea of zero and numerical systems, (ii) logic fundamentals applied to both programs and digital electronics, (iii) algebraic approach to arithmetic and logic, (iv) stepwise approach and the utilization of minimal resources, (v) the power of abstraction to build systems (from breaking down problems, to building systems upon layers that hide complexity), (vi) methodological problem solving and critical thinking.

## Studying Canine Evolution Using Mitochondrial DNA

*Presenter:* Kristen Webb, George Washington University, Biology

The domestic dog is an extremely diverse species in terms of size, color, conformation and behavior. While artificial selection has been the driving force behind much of this diversity, the genetic variation between breeds is the ultimate cause. The results of mitochondrial and nuclear DNA studies which attempt to unravel the history of canine evolution vary on when the dog evolved from its closest known relative, the gray wolf (*Canis lupus*). Analyses support the appearance of the first domestic dog anywhere between 76,000 years ago (ya) and 8,000 ya (Vila et al., 1997; Savolainen et al., 2002; Verginelli et al., 2005). Additional conflict arises when attempting to determine whether there was a single or multiple domestication events, and where the first domestication event(s) occurred (Wayne and Vila, 2001; Savolainen et al., 2002; Leonard et al., 2002; Verginelli et al., 2005). The initial stage of our project involved sequencing the canine mitochondrial control region, the most variable region of the mitochondrial genome. Given the relatively recent origin of the domestic dog, this region of high variability is often studied in an attempt to determine the relationships of different breeds. Our results support previous conclusions that variation occurs in the control region not only between individuals of different breeds but also between individuals of the same breed as well as within the same individual. While the control region is not informative enough to allow us to distinguish between breeds, it can still provide insight into the evolutionary history of canines. The next phase of our project will be to sequence the complete mitochondrial genomes of select individuals based on the results of the control region analysis. This additional data will help define relationships between different dog breeds and resolve questions on canine evolution.

## The Council for Higher Education Accreditation vs. the U.S. Congress: Accountability Mechanisms in Self-Regulating Regimes

*Presenter:* Paul Weissburg, George Mason University, Public Policy

Self-regulating agencies present a challenge to the notion of accountability in a democracy. In theory, public policy in a democratic system is created according to the will of the people. Self-regulating agencies, however, are often self-appointed and are accountable to no democratic institution. In what cases are such agencies appropriate, and perhaps even necessary? This paper looks at the issue of self-regulation as an historical process but with a focus on the Council for Higher Education Accreditation (CHEA). The history of CHEA is an instructive example of how self-regulating agencies form, why they are sometimes necessary, and the potential problems that they present to democracies. The autonomy of CHEA is currently an issue of growing debate within Congress, thus providing a timely example of the conflicts that can arise over the need for accountability from self-regulating industries and agencies. Through the lens of Mancur Olson's "Rational Actor" model, we find that self-regulating agencies often arise out of enlightened self-interest on the part of private organizations that seek to avoid government interference. In the case of CHEA, however, the higher education sector has grown in size and in national importance over the past several decades. Up until now, self-regulation has worked very well, but it may no longer be feasible to keep the government out of the accreditation process. This suggests that the freedom to self-regulate may diminish as an industry enters the public's spotlight, even if the desire to self-regulate remains strong. The issue of self-regulation is largely overlooked by political science literature. This study offers a provocative introduction to a subject that is seldom discussed but one that plays an ever-increasing role in the creation of public policy.

**Torture, Photography and Truth: Reading the Abu Ghraib Archive(s)**

*Presenter:* John M. Woolsey, George Mason University, Cultural Studies

This project examines the Abu Ghraib images in an attempt to explore the relation between torture and photography as practices that produce "truth." More specifically in relation to the Abu Ghraib images, the project intends to answer two critical questions: How is it that the Abu Ghraib photos operate as, or fail to operate as, evidence of torture? And, how are the practices of photography related to techniques of torture that aim to render truth from the bodies of others? It is the initial claim of this project that photography at Abu Ghraib did not merely document acts of torture, but was a contriving and constructing component of those acts. The project consists of three parts. First, it compares popular and theoretical notions of the nature of photographs and the way that they acquire meaning and produce knowledge. Second, it looks closely at the Abu Ghraib photos in order to map the metaphorical and at times literal similarities between practices of photography and techniques of torture. The project concludes by briefly sketching the mechanisms by which the photos were "framed" in the public realm as evidence of "rogue elements" acting without the consent of their superiors, rather than evidence of America's adoption of a systematic policy of global torture.

**Ray Tracing Methods in Mode Conversion Regions**

*Presenter:* Yanli Xiao, College of William & Mary, Physics

Mode conversion is a process in which two different types of waves can exchange energy. This phenomenon occurs in many types of natural systems, from the atmosphere of the sun to chemical reactions, and in the laboratory, from large fusion energy experiments to precise quantum measurements. This poster will provide a brief pedagogic review of a recently- developed approach to mode conversion that uses ray tracing. A brief review of ray theory for vector wave equations far from conversion will also be presented. A primary theme is that, although ray tracing methods break down in the conversion region, the ray geometry in those regions can be used to develop local coupled wave equations that govern the two waves undergoing conversion. In this poster we will present recent results showing how this method works for the case of resonant interaction of two oscillators.

**TR-MOI of Superconducting YBCO Thin Films**

*Presenter:* Ran Yang, College of William & Mary, Applied Science

We report on the evolution of the vortex state in response to a high frequency ac current in  $\text{YBa}_2\text{Cu}_3\text{O}_{6+d}$  thin films in a perpendicular magnetic field. Quantitative timeresolved magneto-optical imaging measurements show that the ac current enables the system to reorganize in two coexisting states with different characteristics: a quasi-ordered state in the sample interior and a disordered state near the edges. The total current density distribution can be separated into a quasi-static symmetric shielding current and a time dependent asymmetric transport current. We discuss the effects of the mutual interaction of both transport current and shielding current and their consequences in ac-losses determinations.

**The Degree of Intermonomeric Disulfide Polymerization within Trout Antibodies Related to the Affinity of the Molecules**

*Presenter:* Jianmin Ye, Virginia Institute of Marine Science, Marine Science

Trout IgM antibody, an 800 kDa tetrameric Ig, possesses considerable structural diversity (redox form) due to non-uniform disulfide cross-linking of the monomeric subunit. The potential association of the degree of intermonomeric disulfide bonding within trout IgM antibody molecules with their affinity was examined. Three distinctly different tactics were employed to examine this relationship: 1) fractionation of high and low affinity antibodies from immune sera by differential immunoadsorption, 2) selective induction of high vs. mixed affinity antibodies in vitro, and 3) analysis of total serum antibodies undergoing affinity maturation in vivo. All three methods demonstrated that high affinity antibodies were the most extensively disulfide cross-linked. Although antibodies from each serum source or individual fish exhibited this relationship, the relationship did not directly correlate between individuals, indicating distinct individuality with respect to the precise level of cross-linking for each individual.

## Notes

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These awards acknowledge W&M students whose research presentation shows:

- Original investigation and the integration of knowledge, and
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### William & Mary Scholars

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JENNA SIMPSON, American Studies. Advisor: Dr. Arthur Knight

*Screening the Revolution: Williamsburg: The Story of a Patriot as Historic Artifact, History Film, and Hegemonic Struggle*

#### Honorable Mentions

SHEREEN SINGER, Psychology. Advisor: Dr. Mark Leary

*Sociometer Theory Expanded: Interpersonal Aspirations and the Specificity of Multiple Sociometers*

JOHN TERRIZZI, JR., Psychology. Advisor: Dr. Larry Ventis

*The Moral Emotion of Disgust as a Predictor of Prejudicial Attitudes Toward Homosexuals*

#### Award for Excellence in Scholarship in the Natural and Computational Sciences

ANDRIY FEDOROV, Computer Science. Advisor: Dr. Nikos Chrisochoides

*Near-Real-Time Nonrigid Registration for Image Guided Neurosurgery Using Commodity and Grid Computing*

#### Honorable Mentions

ALEX GUNERSON, Biology. Advisor: Dr. John Swaddle

*Resistance of Melanized Feathers to Bacterial Degradation: Is it Really so Black and White?*

CAITLIN KIGHT, Applied Science. Advisor: Dr. John Swaddle

*Does Historical Exposure to Humans Affect Current Responses to Anthropogenic Disturbance? A Multispecies Comparison*

ELISE LARSEN, Biology. Advisor: Dr. Bryan Watts

*Do Birds Like McDonalds? How Diet Affects Bird Diversity in the City*

### Visiting Scholars

#### Award for Excellence in Scholarship in the Humanities and Social Sciences

BONNIE RICHARD, Anthropology, George Washington University. Advisors: Dr. Richard Grinker & Dr. Barbara Miller

*Parents and Disability in Ladakh: Coping, Cure-seeking, and Awareness*

#### Honorable Mention

ALISSA HOLLAND, Psychology, Virginia Tech. Advisor: Dr. David Harrison

*Lateralized Differences in Systolic Blood Pressure Regulation and Phoneme Detection as a Function of Hostility Level and Stress*

#### Award for Excellence in Scholarship in the Natural and Computational Sciences

KRISTEN WEBB, Biology, George Washington University. Advisor: Dr. Marc Allard

*A Study of the Evolution of the Domestic Dog, Canis familiaris, Using Mitochondrial DNA*

#### Honorable Mention

JORGE VASCONCELOS, Computer Science, Johns Hopkins University. Advisors: Dr. Susan Blunck & Dr. Scott Smith

*Development Adaptive-Questioning Techniques to Screen Problem Solving Abilities Related to Computer Programming Instruction*

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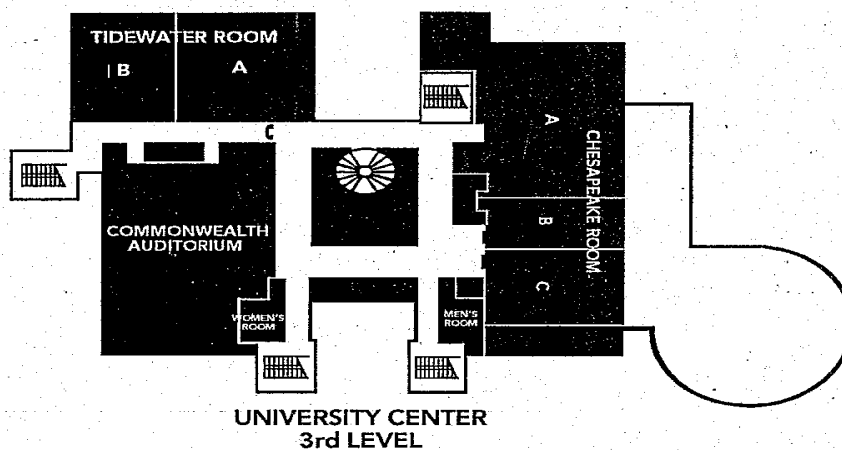
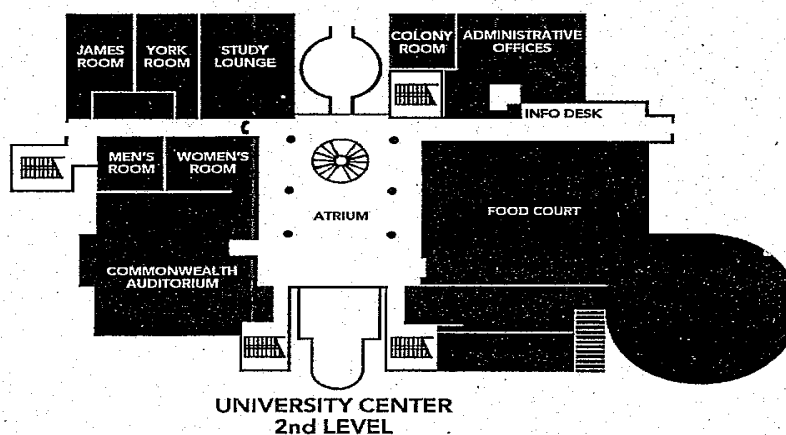
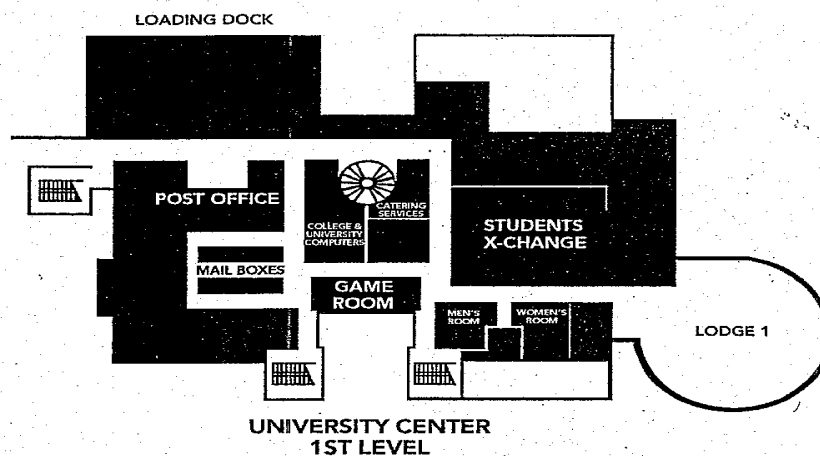
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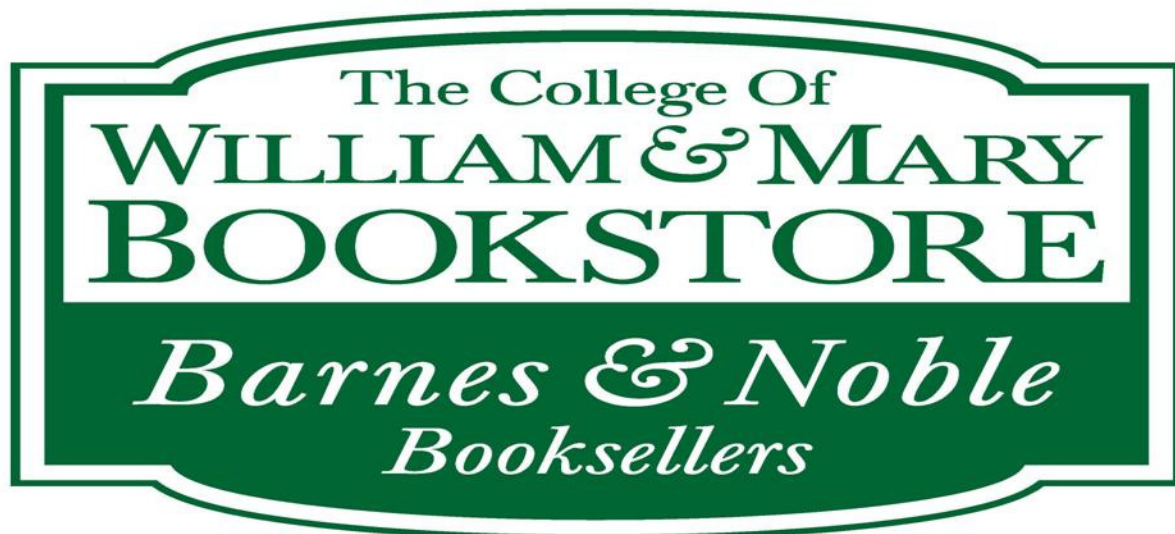
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