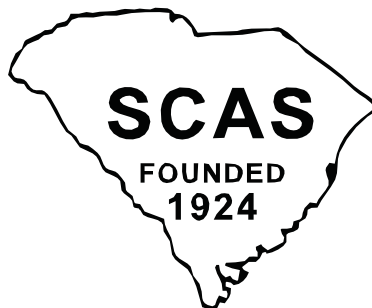


ISSN-0096-414X

**BULLETIN**  
  
of the  
  
**SOUTH CAROLINA  
ACADEMY OF SCIENCE**

**INCLUDING 2007 MEETING PROGRAM**



**VOLUME LXIX  
2007**

**THE SOUTH CAROLINA ACADEMY OF SCIENCE  
FOUNDED 1924, COLUMBIA, SOUTH CAROLINA  
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Tom Roop, Sandhills MESAS Director ..... Francis Marion University  
Cassandra. J. Runyon ..... College of Charleston  
Judith Salley ..... SC State University  
George Shiflet ..... Wofford College  
Linda Sinclair, Science Week, S.C. Dept of Ed. Rep. .... S.C. Dept. of Education  
Tina Webb-Browning, Science Fair Coordinator ..... Hilton Head High School  
Mary Whaley, Low Country MESAS Director

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with the annual meeting of the Academy.

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**BULLETIN**  
  
of the  
  
**SOUTH CAROLINA  
ACADEMY OF SCIENCE**

**INCLUDING 2007 MEETING PROGRAM**



**VOLUME LXIX  
2007**

*The South Carolina Academy of Science, together with the South Carolina Junior Academy of Science, is the only statewide interdisciplinary science organization whose membership includes: high school students, teachers, administrators, college students, professors, scientists, related professionals, parents of students, college presidents, business executives, small and large businesses, financial institutions, and institutions of higher education.*

*Its purposes are:*

- *To promote the creation and dissemination of scientific knowledge within the state of South Carolina by stimulating scientific research and publication.*
- *To improve the quality of science education in the state of South Carolina.*
- *To foster the interaction of business, industry, government, education and the academic scientific community.*
- *To improve public understanding and appreciation of science through support of the Junior Academy of Science.*
- *To encourage young people to become involved in science through support of the Junior Academy of Science.*

*The South Carolina of Science (SCAS) was organized in 1924, and in 1927 the Academy affiliated with the American Association for the Advancement of Science. Publication of the Bulletin of the Academy began in 1935, and in 1973 the Newsletter was established as a vehicle for communication among members. Beginning in the 1960's, industry and business joined academic institutions in support of the Academy and have helped to set goals to aid and improve the development of science in South Carolina. Its annual meetings provide a forum for the exchange of scientific information among members. Sponsorship of numerous awards, science programs and student research projects are yearly activities of the Academy.*

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# *Journal of the South Carolina Academy of Science*

Publish Your Meeting Abstracts!

Did you know the South Carolina Academy of Sciences publishes a peer-reviewed electronic journal? The journal also includes a 2007 meeting proceedings section (non-peer reviewed), so please submit extended versions of your oral and poster presentations! Publication of your research as part of the meeting proceedings section does not prevent subsequent publication of your material in a peer-reviewed outlet such as the SCAS Journal. Articles for peer-review are being accepted for the Fall issue. Research articles, review papers, and notes are welcome.

Your peer-reviewed electronic journal may be viewed by selecting the “SCAS Journal” link on the SCAS home page (<http://www.scacadsci.org/home.htm>). Instructions for authors are available on the web site. Please take time to review the Journal.

Thanks to USC Upstate for hosting the SCAS Journal on its web site. For additional information, visit the Journal web site or contact the current SCAS Journal editor.

David K. Ferris  
SCAS Journal Editor  
[dkferris@uscupstate.edu](mailto:dkferris@uscupstate.edu)

## **SCAS Web Site: [www.scacadsci.org](http://www.scacadsci.org)**

With the help of funds from the State Legislature, the South Carolina Academy of Science maintains the domain name — SCACADSCI (South Carolina Academy of Science). The web site has been functioning since October of 1999.

The Website features include, but are not limited to: online registration for SCJAS & MESAS events, Journal access, links to NAAS website, and other documents for download, such as registration documents and information about the SCAS events and Science Fairs. Criteria and nomination forms for Teacher of the Year and the Governor’s Award of Excellence in Science also are available for download.

The Academy extends thanks to Erskine College for volunteering web site space on their server and to Dr. William Junkin. Dr. Junkin’s creates programs so the Webmaster can maintain the website. His vast web experience is constantly called upon as we continue to improve the site. General content for the website is cleared and uploaded by the SCAS Webmaster.

**SCHEDULE, EIGHTIETH ANNUAL MEETING**  
**SOUTH CAROLINA ACADEMY OF SCIENCE**  
**April 19<sup>TH</sup> AND 20<sup>TH</sup>, 2007**  
**MIDLANDS TECHNICAL COLLEGE, COLUMBIA, SOUTH CAROLINA**

**Thursday, April 19**

6:00 PM - 8:00 PM                      SCAS Council Meeting and Dinner                      TBA

**Friday, April 20**

**7:30AM - 6:30PM                      SCAS Annual Meeting**

**7:30 AM - 2:00 PM                      Registration, SCAS & SCJAS**  
 Academic Center, 1<sup>st</sup> Floor Lobby

**8:30 AM - 10:20 AM                      Poster Session , Authors' Present**  
 Academic Center Lobby

**8:30 AM - 10:20 AM                      Morning Session                      Senior Academy**

Cellular Biology	Room 115, Academic Center
Chemistry/Biochemistry I	Room 350, Academic Center
Chemistry/Biochemistry II	Room 225, Academic Center
Field Biology	Room 362, Academic Center
Molecular Biology	Room 143, Academic Center
Pharmacy	Room 351, Academic Center

**10:30 AM - 11:15 AM                      Plenary Session                      Academic Center**  
 Auditorium

Welcome: Dr. Marshall White                      Room 116  
 President, Midlands Technical College

Introduction of Speaker: Dr. Thomas Reeves, Midlands Technical College  
 SCAS President-elect and Program Chair

Keynote Presentation: ***Dr. Michele Dominick Bishop,***  
***Professor of Gastroenterology and Hepatology***  
***Mayo Clinic, Jacksonville, Florida***

Awards Presentation: Dr. Hans-Conrad zur Loye, SCAS President

Introduction of New  
 Council Members: Dr. J. David Gangemi, SCAS Vice President

**10:30 AM - 11:15 AM                      Dr. Bassam Shakhashiri                      Academic Center**  
***Chemistry Demonstrations***                      Auditorium  
 Room 116

*(Schedule continued on next page)*

**SCHEDULE, EIGHTIETH ANNUAL MEETING  
SOUTH CAROLINA ACADEMY OF SCIENCE  
April 19<sup>TH</sup> AND 20<sup>TH</sup>, 2007  
MIDLANDS TECHNICAL COLLEGE, COLUMBIA, SOUTH CAROLINA**

<b>12:15 PM - 1:15 PM</b>	<b>SCJAS and SCAS Lunch</b>	Academic Center Room 143
<b>1:00 PM - 5:20 PM</b>	<b>Afternoon Sessions</b>	<b>Senior Academy</b>
Cellular Biology	Room 115, Academic Center	
Chemistry/Biochemistry I	Room 350, Academic Center	
Chemistry/Biochemistry II	Room 225, Academic Center	
Field Biology	Room 362, Academic Center	
Geography/Geology/ Psychology	Room 101, Academic Center	
Math/Computer Science/ Meteorology	Room 218, Academic Center	
Molecular Biology	Room 143, Academic Center Mary Robertson Conference Room	
Physics/Astronomy	Room 113, Academic Center	
Public Health	Room 351, Academic Center	
<b>2:30 PM - 5:00 PM</b>	<b>Speaking of Science</b> MTC Speech Competition	Academic Center Auditorium Room 116
<b>5:00 PM - 5:30 PM</b>	<b>SCAS Business Meeting</b> (all members invited)	Academic Center Room 143
<b>5:30 PM - 6:30 PM</b>	<b>Featured Speaker:</b> <i>Mr. Howard Burnham</i> <i>On the Shoulders of Giants</i>	Academic Center Room 143
<b>6:30 PM - 7:45 PM</b>	<b>Junior Academy Awards Banquet</b> Mary Robertson Conference Room	Room 143

SCAS and SCJAS Judges Room	Room 139 Academic Center Executive Conference Room
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## Biographical Sketches

### *Invited Speakers Featured at the 2007 SCAS Annual Meeting*

In addition to more than 200 research presentations, the 2007 SCAS Annual Meeting will feature an interesting array of invited speakers. Coming from areas of expertise including medicine, chemistry, and historical science research a common thread will be woven through the presentations concerning the critical need to effectively translate scientific research into public awareness and scientific literacy.

The keynote presentation during the plenary session will be given by **Dr. Michele Dominick Bishop**, Assistant Professor of Medicine at the Mayo Medical School in Jacksonville, Florida. Dr. Dominick Bishop is a nationally recognized expert in gastroenterology and hepatology who specializes in pancreatic diseases. Dr. Dominick received an M.D. from the Medical University of South Carolina in Charleston, S.C. in 1993 and a M.M.Sc from Harvard Medical School in Boston, Mass. in 2000. Dr. Dominick has won numerous awards including the Internal Medicine Teaching Award from the Mayo Clinic in Jacksonville; National Pancreas Foundation, Best Abstract in Clinical Pancreatology; and the American College of Gastroenterology Clinical Research Award. Among her more recent publications are:

Bishop MD, Davis CJ, Nguyen JH, Krishna M. Solid-Pseudopapillary Tumor of the pancreas: Case Report of the Natural History of a Tumor Over Thirty Years. *Surgical Rounds* 2006 (in press).

Bishop MD, Freeman SD, Zielenski J, Ahmed N, Dupuis A, Martin S, Ellis L, Shea J, Hopper I, Corey M, Kortan P, Haber G, Ross C, Tzountzouris J, Ray PN, Tsui L-C, Durie PR. The Cystic Fibrosis Transmembrane Conductance Regulator Gene and Ion Channel Function in Patients with Idiopathic Pancreatitis. *Human Genetics* 2005; 118:372-381.

In addition to being widely known for her expertise in pancreatology, Michele is a graduate of Brookland-Cayce High School in Cayce, SC and a former award-winning member of both the South Carolina Junior Academy of Science and the SCAS. We are delighted to welcome Michele back to South Carolina as our keynote speaker!

**Dr. Bassam Shakhshiri**, a Professor of Chemistry at the University of Wisconsin-Madison will present *Science and Scientific Literacy*. According to Dr. Shakhshiri, "Our democratic society is becoming increasingly dependent on science and technology. It is essential for the well-being of our society that all citizens develop an appreciation of science, the benefits of technology, and the potential risks associated with advances in both. Citizens must gain 'science literacy'. Dr. Shakhshiri is the first holder of the William T. Evjue Distinguished Chair for the Wisconsin Idea. He is well known internationally for his effective leadership in promoting excellence in science education at all levels and for his development and use of demonstrations in the teaching of chemistry. The *Encyclopedia Britannica* cites him as the "dean of lecture demonstrators in America." His scholarly publications, including the multi-volume series, *Chemical Demonstrations A Handbook for Teachers of Chemistry*, are models of learning and instruction that have been translated into several languages.

As an advocate for chemistry Professor Shakhashiri has given over 1100 invited lectures and presentations in North America, Europe, Asia, Australia, the Middle East, and South America. Professor Shakhashiri has given numerous presentations at professional meetings, named lectureships and is a featured speaker at dedications of new science buildings, science centers, commencements, and honors convocations. Professor Shakhashiri has been featured in newspapers, magazines, national and local radio and television, including the New York Times, the Washington Post, *Newsweek*, Time, the German-language Business Week, *Today's Chemist*, NBC Nightly News, National Public Radio, CNN, and the Larry King Show.

In 1977, Professor Shakhashiri was the founding chair of the University of Wisconsin System Undergraduate Teaching Improvement Council. In 1983 he founded the Institute for Chemical Education (ICE) and served as its first director. His work with ICE inspired the establishment of the Center for Biology Education, the Merck Institute for Science Education, the Miami University (of Ohio) Center for Chemical Education, among others.

Professor Shakhashiri currently directs the Initiative for Science Literacy and its various programs including Science in the City, SCIENCE IS FUN! public presentations, the SCIENCE IS FUN web site [www.scifun.org](http://www.scifun.org), Science, the Arts, and the Humanities, Women in Science, and the Conversations in Science Series.

Professor Shakhashiri is the recipient of over 35 awards, including the 2002 American Association for the Advancement of Science Award for Public Understanding of Science and Technology. In 2004 he was inducted into the Hall of Fame of the national chemistry fraternity Alpha Chi Sigma. In 2005 he received the Madison Metropolitan School District "Distinguished Service Award for Citizen", was elected Fellow of the Wisconsin Academy of Sciences, Arts and Letters, received the CHEMICAL PIONEER Award from the American Institute of Chemists, the American Chemical Society Helen M. Free Award for Public Outreach for "lifelong accomplishments and for explaining and demonstrating science with charisma and passion". He is the recipient of five honorary doctoral degrees.

**Mr. Howard Burnham** will present *On the Shoulders of Giants* in which he will portray five famous scientists whose vision and research changed the course of human history including Aristotle, Louis Pasteur, Sir Isaac Newton and Albert Einstein. Mr. Burnham not only has conducted meticulous research concerning the background, research, and lives of these scientists, but also portrays these individuals during his presentation. Born in Bournemouth, England and educated at Clayesmore School, Dorset, and at University College in the University of Durham, Mr. Burnham is a gifted scholar who has worked as an educator, museum curator, and actor. His historical characterizations have been presented throughout the United States and have included portrayals of Charles Darwin, Lewis Carroll, Shakespeare, George Bernard Shaw, General Thomas Sumter and many others. Mr. Burnham is developing this new monolog exclusively for the 2007 SCAS Annual Meeting.



## The South Carolina Academy of Science

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### LETTER FROM THE PRESIDENT



I am very pleased to serve the South Carolina Academy of Science as its current President, and I want to encourage all of you to support and promote this important volunteer organization in our state. At this time—when the public must become informed about scientific issues, such as global climate change, that will directly affect their way of life—I hope that the Academy can play a leading role in providing accurate and unbiased scientific information to the residents of our state as well as to our state government. We have the collective expertise that can help this state and its residents understand current and future complex scientific issues and hope that people and government officials will take advantage of it.

The South Carolina Academy of Science, with the South Carolina Junior Academy of Science, is the only state-wide interdisciplinary science organization whose membership includes high school students, teachers, administrators, college students, professors, scientists, related professionals, parents of students, college presidents, business executives, owners of large and small businesses, as well as leaders of financial institutions and institutions of higher education. One reason for this broad spectrum of support for the Academy is that, individually and collectively, all share a deep commitment to stimulate the creative abilities of the youth of our state and to provide learning opportunities that allow for the development of their talents.

To ensure that we continue to fulfill our mission, I ask each one of you to renew your membership and, if at all possible, to recruit one new member for the Academy this year.

Sincerely,

Dr. Hans-Conrad zur Loye  
President

Please join the South Carolina  
Academy of Sciences in thanking our  
Meeting and Award sponsors:



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*The Milliken Foundation*

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**Their continuing support of the South Carolina**  
**Academy of Science activities is very much**  
**appreciated.**

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Clemson University Office of the Provost	Pete Mazzaroni 6173 E. Old Marion Hwy. Florence, SC	Lander University
Coastal Carolina University	MUSC Library & Learning Resources Charleston, SC	Phibro-Tech Inc 1 Parker Plaza Fort Lee, NJ
College of Charleston, School of Science and Mathematics	Mike Farmer Applied Education Technology Tigerville, SC	SC Association of Conservation Districts Columbia, SC
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USC Sumter Sumter, SC	Carolina Eastman Company Columbia, SC	University of South Carolina Columbia  Dave Gillespie Presbyterian College

**SOUTH CAROLINA ACADEMY OF SCIENCE  
EXCELLENCE IN SECONDARY SCIENCE  
OR MATHEMATICS TEACHING  
(TEACHERS OF THE YEAR)**

John D. Bernard, 1970 .....	Lower Richard High School
Major C. Rhodes, 1972 .....	Spartanburg High School
Troy Bridges, 1972 .....	Spartanburg High School
Elizabeth Reagan, 1974 .....	J. L. Mann High School
Katherine J. Farnell, 1975 .....	Spring Valley High School
William J. Hilton, Jr, 1976 .....	Fort Mill High School
Margaret W. Cain, 1977 .....	Sumter High School
Carline Bowers, 1978 .....	Spring Valley High School
Naomi Seifert, 1979 .....	Spartanburg High School
Maxine Moore, 1980 .....	Spartanburg High School
Elizabeth Lashley, 1981 .....	D.W. Daniels High School
Lucretia Herr, 1982 .....	Spring Valley High School
Michael H. Farmer, 1983 .....	Riverside High School
Glenda George, 1984 .....	Richland Northeast High School
Myra Halpin, 1985 .....	Goose Creek High School
Jessica B. Creech, 1986 .....	Hartsville High School
Jane P. Ellis, 1987 .....	Dixie High School
Linda D. Sinclair, 1988 .....	Lexington High School
Johanna O. Killoy, 1989 .....	Dreher High School
Wyatt Y. McDaniel, 1990 .....	Spartanburg High School
Sonda F. Weiland, 1991 .....	Fort Mill High School
John L. Kinard, 1992 .....	Spartanburg High School
Larry Jones, 1993 .....	R.C. Edward Jr. High School
Dianne H. Earle, 1994 .....	Dorman High School
David Salter, 1995 .....	Aiken High School
Richard Hager, 1996 .....	Ridge View High School
Charlotte Meares, 1997 .....	Academic Magnet High School
Leone Rochelle, 1998 .....	Spring Valley High School
William C. Alexander, 1999 .....	Gov. School for Science and Mathematics
Ginger R. Foley, 2000 .....	Spring Valley High School
Annitra Jean Allman, 2001 .....	Mullins High School
Ruth S. Taylor, 2002 .....	Mayo High School
Patricia Ann Smith, 2003 .....	Greer High School
Randolph M. Brooks, 2004 .....	Dreher High School
Maureen M. Albright, 2005 .....	Lakewood High School
Christopher D. White, 2006 .....	Seneca High School

## South Carolina Academy of Science

### 2006 Award for Excellence in Secondary Science or Mathematics Teaching



Dr. Tom Roop and SCAS Teacher  
of the Year Christopher White

### Christopher D. White Seneca High School

Christopher D. White, Physics teacher at Seneca High School, has been selected as the South Carolina Academy of Science Teacher of the Year for 2006. His award was officially presented at the SCAS Annual Meeting held at the University of South Carolina in Columbia Friday, March 10, 2006 by Dr. Tom Roop, Chair of the Teacher of the Year Committee.

Mr. White is a National Board Certified teacher and chair of the Science Department, just 8 years after graduating from Clemson University. He spent two summers at R.IT. training for project Lead the Way; an engineering principles and design curriculum now implemented at his school. He is also working on his Masters degree at the University of Virginia.

He was named the Teacher of the Year at his school and also for Oconee County. Besides traditional labs, demonstrations and calculations, Mr. White's unique innovations involve students with real-life problems, such as forces involved when a ballplayer slides into base. He takes students to 6 Flags for Physics Day, organizes engineering design competitions, and was the first S.C. teacher to take high school students to a convention on electric cars. The latter is now implemented in the curriculum as the electric vehicle pilot project. Next year he will present a new Physics of Sports class.

Chris White's service to his school includes coaching both track and cross country. He also developed the curriculum guide for Oconee County teachers of Physical Science. Kathryn Faris, Principal of Seneca high School considers Mr.White to be "Capable, dedicated, and an asset to our school." She also notes that it is "difficult to find teachers with his talent, ambition and drive."

The South Carolina Academy of Science congratulates Mr. White on this achievement and many more to come.

## Governor's Award for Excellence in Science 2007

The award was established in 1985 by the Drug Science Foundation to honor specifically an individual or team within the state whose achievements and contributions to science in South Carolina merit special recognition and to promote wider awareness of the quality and extent of scientific activity in South Carolina. Since 1989, the award, named the "Governor's Award for Excellence in Science", has been under the joint sponsorship of the Governor's office and the South Carolina Academy of Science. In 1993 these groups were joined by the Dewees Development Corporation and Harbor Watch of Charleston. In 2000 and 2004, respectively, **Roche Carolina Inc.** and **MeadWestvaco** joined in sponsorship of the Governor's Awards. In 2005 **Michelin North America** joined the sponsorship and Winthrop University (The Host for the 2005 SCAS Annual Meeting) also supported the Governor's Awards for Excellence in Science.

Beginning in 1990 two of these awards are given annually with one being for scientific discovery and the other for scientific awareness. In 2005, SCAS, in conjunction with the Governors Office, established a third award. This award is directed to a gifted young researcher (approximately 10 years or less experience). The award consists of an honorarium of \$1,000 and a handsomely framed certificate which is presented to the recipient at a special awards ceremony held in the spring in conjunction with the South Carolina Academy of Science's annual meeting.

Candidates should be currently working in South Carolina or have conducted a substantial portion of their work within the state. Contributions may be in any area of science, and may be for service to science through non-formal education in the various media, for exemplary exposition at the college or university level, or as an acknowledgement for significant outstanding formal research. The award may be given to an individual or a team. If the award is made to a team, the honorarium will be distributed equally.

Dr. Don M. Jordan  
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Sumwalt Room 323  
University of South Carolina  
Columbia SC 29208  
Email: [Jordan@gwm.sc.edu](mailto:Jordan@gwm.sc.edu)

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The South Carolina Academy of Science gratefully recognizes the contribution of  
**Roche Carolina, MeadWestvaco, and Michelin North America**  
for their support of the  
**Governor’s Award for Excellence in Science**  
1985-1988 Drug Science Foundation Award for Excellence in Science  
1989-Present Governor’s Award for Excellence in Science

**PAST RECIPIENTS**

James R. Durig, 1985 ..... University of South Carolina  
Howard F. Harrison, 1986. .... CR Seeds, Hartsville, South Carolina  
F. John Vemberg, 1987. .... University of South Carolina  
Danyl D. DesMarteau, 1988. .... Clemson University  
Harry S. Margollus, 1988. .... Medical University of South Carolina  
Lon B. Knight, Jr., 1989. .... Furman University  
Paul D. Ellis, 1990. .... University of South Carolina  
William J. Padgett, 1990. .... University of South Carolina  
James A. Marshall, 1991. .... University of South Carolina  
Rudolph E. Mancke, 1991. .... SC Educational Television Network  
Makio Ogawa, 1992. .... Medical University of South Carolina  
Larry Joe McCumber, 1992. .... Francis Marion University  
Yakir Aharonov, 1993. .... University of South Carolina  
William F. Junkin, III, 1993. .... Erskine College  
Donald D. Clayton, 1994. .... Clemson University  
R. Bruce Dunlap, 1994. .... University of South Carolina  
Frank Avignone, 1995. .... University of South Carolina  
Daniel Antion, 1995. .... University of South Carolina  
Elizabeth Martin, 1996. .... College of Charleston  
Maria G. Buse, 1996. .... Medical University of South Carolina  
John H. Dawson, 1997. .... University of South Carolina  
Sarah F. Stallings, 1997. .... Winthrop University  
Joseph Manson, 1998. .... Clemson University  
George E. Temple, 1998. .... Medical University of South Carolina  
Michael Farmer, 1999. .... Greenville Technical College  
Roy Edward Wuthier, 1999. .... University of South Carolina  
Thomas Borg, 2000. .... South Carolina School of Medicine  
Louis Terracio, 2000. .... South Carolina School of Medicine  
Elaine L. Craft, 2000 ..... State Center for Excellence  
Kenneth Marcus, 2001. .... University of South Carolina Aiken  
Jeffrey M. Priest, 2001 ..... University of South Carolina Aiken  
Roger R. Markwald, 2002. .... Medical University of South Carolina  
William T. Pennington, 2002. .... Clemson University  
Richard D. Adams, 2003 ..... University of South Carolina Columbia  
Charles Beam, 2003. .... College of Charleston  
John W. Baynes, 2004. .... University of South Carolina Columbia  
David J. Stroup, 2004. .... Francis Marion University  
Frank Berger, 2005 ..... University of South Carolina Columbia  
Thomas Reeves, 2005 ..... Midlands Technical College  
Ya-Ping Sun, 2005 ..... Clemson University  
Gabriel Virella, 2005 ..... Medical University of South Carolina

## 2006 Governor's Award for Excellence in Science Awareness

The 2006 Governor's Award for Science Awareness is awarded to both

**Dr. Omar Bagasra, M.D., Ph.D.**

and

**Dr. Rebecca Bullard-Dillard**

**Dr. Omar Bagasra, M.D., Ph.D.**

Recipient of the Governor's Award for Excellence in Scientific Awareness, 2006.

The 2006 Governor's Award for Excellence in Scientific Awareness recognizes Dr. Omar Bagasra of Claflin University for his outstanding contributions to science education. Dr. Bagasra currently serves as Professor of Biology and the director of the South Carolina Center for Biotechnology at Claflin University in Orangeburg, SC. Omar earned a bachelor's and a master's degree in biochemistry from the University of Karachi in Pakistan. In 1972, he flew to Chicago's O'Hare airport—carrying just a suitcase of clothing and a hundred dollars in his pocket. Omar saved his wages and in 1976 he enrolled at the University of Louisville as a full time graduate student and doctoral candidate. By 1980, Omar had earned a Ph.D. in microbiology and immunology. Soon thereafter, Omar decided to go to medical school and went to study medicine at the Universidad Autónoma in Ciudad Juarez, Mexico. After two years of study, he went to Temple University, where he completed his clinical training as well as resumed his position at Hahnemann University as Assistant Professor in the Department of Pathology. Dr. Bagasra completed his residency in Surgical Pathology at Hahnemann and Temple University and a Fellowship in Clinical Laboratory Immunology at St. Christopher's Hospital for Children in Philadelphia, PA.

After a total of eight years at Hahnemann, Dr. Bagasra went to UMDNJ for a short time where he developed the famous technique of *in situ* PCR. Then, he moved to Thomas Jefferson University in Philadelphia where, from 1990-98, he served a Full Professor of Medicine, the Director of the Molecular Retrovirology Laboratories and Section Chief of Molecular Diagnostics of the Center for the Study of Human Viruses, while also a Professor of Medicine.

During the last few years, he has received several international prestigious awards and recognitions. *The Institut Pasteur's Luc Montagnier, the discoverer of the AIDS virus*, described Bagasra as “a skillful researcher...(and) a discerning scholar who explores new ideas”, observing he already had a track record for challenging conventional wisdom and being proved correct. “Every scientist now knows that a significant percentage of circulating lymphocytes are infected with HIV....but in 1992 his findings were highly controversial,” he wrote. Recently, Omar's book, *HIV and Molecular Immunity*, was reviewed in “*Cell*”. The reviewer writes, “Overall, *HIV and Molecular Immunity: Prospects for the AIDS Vaccine* is a well-researched (with more than 800 references cited) and bold presentation of a novel concept.”

Dr. Bagasra's research interests have long been associated with the study of HIV and AIDS. In fact, he has been on the trail of the virus since 1981—the year of the first scientific report. For the past several years, he has focused on trying to gain insight into the molecular pathogenesis of HIV. His unswerving dedication to his work has resulted in over 150 scientific articles, book chapters, and books.

Recently, Dr. Bagasra has expanded his research to other areas and currently research interests include: i) the role of zinc transporters in the molecular pathogenesis of prostate cancer and diabetes, and ii) the development of molecular vaccine against HIV-1. In summary, Dr. Bagasra's scholarly work has brought great recognition to South Carolina and to Claflin University.

### **Dr. Rebecca Bullard-Dillard**

Recipient of the Governor's Award for Excellence in Scientific Awareness, 2006.

The 2006 Governor's Award for Excellence in Scientific Awareness recognizes Dr. Rebecca Bullard-Dillard of Claflin University for her outstanding contributions to science education.

Dr. Rebecca Bullard-Dillard was born in Alabama but raised and educated from age ten in the Greater Columbia Metropolitan area. She earned her B.S. degree in Biochemistry at North Carolina State University in 1990 and was named Outstanding Biochemistry Student of the Year for that graduating class. She was accepted to a Ph.D. degree program at the University of South Carolina, Department of Chemistry and completed that degree in 1996. She joined the faculty of Claflin University as an Assistant Professor of Biology in the fall of the 1996/97 academic year. In her time there she has had a profound influence on the culture of the institution.

Over the past ten years at Claflin University, Dr. Bullard-Dillard has engaged in an unflagging campaign to bring research activities and research resources to the campus so that faculty and students might participate more fully in the scientific enterprise of the state. She is a deeply committed and vocal proponent of the need to increase the participation of underrepresented groups as contributing scientists. Her dedication to increasing the number of minority researchers and scientists for the state and nation has been acknowledged through her past membership on the Diversity Advisory Board for the Medical University of South Carolina's School of Allied Health Professions and through the honor of having her name placed on the Southern Poverty Law Center's Wall of Tolerance Memorial in Montgomery, Alabama.

Due to her own experiences as an undergraduate researcher, Dr. Bullard-Dillard is a vocal proponent for the use of research as a means of teaching science to budding scientists. In the fall of 1999 she was asked to serve as the Chair for the Department of Biology and still serves in that capacity. In addition, she was asked to train in Research and Grants Administration in the spring of that year and completed a 40 hour course in Sponsored Programs management taught through the U.S. Department of Health and Human Services' Office of Minority Health. In 2000, Dr. Bullard-Dillard

won an Extramural Associates Research Development Award from the National Institutes of Health and was employed as an Extramural Associate during the summer of 2000. As a result of the activities funded via that grant, Dr. Bullard-Dillard was appointed to the position of Director of Research Development for Claflin University.

Dr. Bullard-Dillard's efforts to build research capacity in the sciences at Claflin have led to several grant funded agreements with researchers at Clemson, MUSC and the University of South Carolina. She has been Principal Investigator (PI), Co-PI or has assisted in the authoring of grant awards to the institution of over \$12,000,000 in the past 5 years.

Dr. Bullard-Dillard is currently a member of the Board of Directors for the Palmetto Biotechnology Alliance and a member of the Steering Committee for the South Carolina IDeA Networks of Research Infrastructure Excellence. In addition, she has been just elected to a three year term as councilor in the biology division of the National Council for Undergraduate Research.

For her many accomplishments, Dr. Bullard-Dillard has been twice nominated and has once been awarded the James E. Hunter Faculty Excellence award. She was chosen as the university's nominee for the Governor's Professor of the Year award in 2002 and 2003, and she has been named to Who's Who among College and University Teachers in five different years.

## **2006 Governor's Award for Excellence in Scientific Research**

The 2006 Governor's Award for Excellence in Scientific Research goes to

### **Dr. Yusuf A. Hannun**

The 2006 Governor's Award for Excellence in Scientific Research recognizes Dr. Yusuf Hannun for his outstanding contributions to the development in cellular signal transduction and the unexpected role of lipids in cell signaling. the molecular biology of cancer, as well as for his exceptionally productive career as a scientist, teacher and scholar.

Dr. Yusuf Hannun grew up in Beirut, Lebanon where he obtained his M.D. degree with distinction from the American University of Beirut. Dr. Hannun continued his medical training at Duke University where he developed his interest in cellular signal transduction and the unexpected role of lipids in cell signaling. Following his training, Dr. Hannun joined the faculty of the Department of Medicine at Duke where he rose through the ranks to become Professor of Medicine.

In his independent career at Duke, Dr. Hannun focused on the emerging roles of lipids in cell regulation. His work led to remarkable discoveries on a class of lipids known as sphingolipids.

Sphingolipids are a class of fatty molecules that have long defied investigation; their very name deriving from the Greek Sphynx because they presented their discoverer, Thudicum(1888), with an enigma that has persisted for nearly a century. Dr. Hannun's work has relentlessly and progressively deciphered this enigma. His studies led to the discovery of the novel class of bioactive sphingolipids; indeed, the field was launched with his initial discovery of biochemical and biological activities of the molecule sphingosine. His group went on to describe, for the first time, the sphingomyelin cycle and the bioactive lipid ceramide. Early on, Dr. Hannun proposed roles for ceramide as a key regulator of how cells respond to stress signals, especially its roles in regulating cell death; a concept that is now firmly established through multiple genetic, biochemical, and pharmacologic studies ranging from yeast to human. In addition, Dr. Hannun and his group have consistently advanced the biochemical and molecular foundations of this field, which, until his studies, had lagged behind other areas of basic biological research.

In summary, Dr. Hannun's scholarly work has brought great recognition to South Carolina.

Importantly, these sphingolipid pathways are increasingly appreciated to play key roles in human disease including aging, neurodegeneration, angiogenesis, inflammation and cancer. Consequently, they have become the targets of novel therapeutics for inflammation, immune suppression and cancer. His work has been of fundamental significance in changing our thinking of lipids from inert membrane molecules to an intricate network of molecules that regulate important cellular functions.

## **2006 Governor's Young Scientist Award for Excellence in Scientific Research**

The 2006 Governor's Young Scientist Award for Excellence in  
Scientific Research goes to

**Dr. Karen Burg**

The 2006 Governor's Young Scientist Award for Excellence in Scientific Research is awarded to Dr. Karen Burg, Hunter Endowed Chair and Professor of Bioengineering at Clemson University. A native of Chapel Hill, North Carolina, Karen began her undergraduate studies as a chemical engineer, earning a B.S. in Chemical Engineering from North Carolina State University (Raleigh, North Carolina) in 1990. Karen completed an M.S. in Bioengineering in 1992 and a Ph.D. in Bioengineering in 1996 and published six papers from her graduate work. During graduate school discussions with surgeons at Carolinas Medical Center (CMC) in Charlotte, North Carolina, Dr. Burg discovered a biology-centric environment that was ripe for biomaterials and engineering research.

She joined the faculty at Clemson University as Assistant Professor of Bioengineering in 1999 and established an absorbable materials research program with application to multiple disease states including orthopedic and soft tissue reconstruction application. She has authored over 60 peer-reviewed publications on the subject of absorbable biomaterials and/or tissue engineering and is currently the co-editor of a CRC press book series entitled "Advances in Polymeric Biomaterials". Dr. Burg has given over 160 invited presentations, including multiple invited presentations at Gordon Research Conferences and National Academies meetings, and she is the inventor listed on three patents and five patent applications.

Karen has capitalized on Clemson University's endorsement of service learning by involving her students in community outreach activities. She recognizes the importance of conveying biomedical concepts to the public and involving the public in the research and education process. Her students have developed and given over fifty interactive overviews of biomedical technologies to K-12 students and educators, both regionally and nationally, and have developed numerous educational modules that have been embedded into science curricula nationally.

In 2003, she was named to Massachusetts Institute of Technology's TR100 Young Innovator list for the development of novel injectable cell-based systems for tissue repair. In 2005, she was awarded an Era of Hope Scholarship from the Department of Defense to develop a tissue engineered drug discovery system, and in 2006 she was elected to the American Institute of Medical and Biological Engineering College of Fellows for her work in developing biomaterials for tissue engineering.

Karen was recently named a Fellow of the American Council on Education. Dr. Burg's fellowship will enable her to better understand the interactions between the South Carolina government and universities and how they may collaboratively provide the highest quality research, education and outreach programs in order to positively impact South Carolina residents.

## TOPICAL SESSIONS

Presenter names are in **bold text**

### CELLULAR BIOLOGY ACADEMIC CENTER (AC 115)

**PRESIDING: SAMIR RAYCHOUDHURY, BENEDICT COLLEGE**

#### Morning Session

8:30 - 8:50 AM

EFFECTS OF 17BETA-ESTRADIOL AND TAMOXIFEN ON CELL CYCLE DISTRIBUTION AND ESTROGEN RECEPTOR-ALPHA EXPRESSION IN MCF-7 CELLS **John Rollinson**, Kirk Kangaloo, Samir Raychoudhury, Dept. of Biology, Chemistry and Environmental Health Science, Benedict College

8:50 - 9:10 AM

THE EFFECTS OF 3-METHYL ADENINE DNA GLYCOSYLASE (3-MEA) IN 54 WILD TYPE (WT) COMPARED WITH .12 WT AND .54E125Q TREATED WITH METHYL METHANE SULFONATE (MMS) ACTING AS A BASE EXCISION REPAIR PATHWAY **Ciera Thomas** and Michael Wyatt, South Carolina Cancer Center and Claflin University

9:10 - 9:30 AM

ADSORPTION OF THE COLIPHAGE T4 TO CLAY MICELLS, **Jennifer Cowan** and Jack A. Turner, Division of Natural Sciences and Engineering, USC Upstate

9:30 - 9:40 AM Break

9:40 -10:00 AM

EXAMINATION OF BIOLOGICAL ACTIVITY ATTRIBUTED TO *LAGERSTROEMIA SPECIOSA*, **Jared L. Miller**, Melissa B. Riley, and Sandra L. Gray, Dept. of Biological Sciences, Clemson University

10:00 -10:20 AM

DOES HOMER2 PROTEIN REGULATE LIGHT INPUT IN THE MAMMALIAN CIRCADIAN TIMING SYSTEM?, **Barbra Bannan**, Elizabeth Meyer-Bernstein, and Pamela Riggs-Gelasco<sup>1</sup>, Dept. of Biology, <sup>1</sup>Dept. of Chemistry/Biochemistry, College of Charleston

#### Afternoon Session

1:30 -1:50 PM

ANALYZING *ENTAMOEBIA HISTOLYTICA* CYTOPATHIC DESTRUCTION IN RESPONSE TO LIPOPROTEIN-CHOLESTEROL, **April Clayton** and Lesly Temesvari, Dept. of Biological Sciences, Clemson University

1:50 -2:10 PM

LACTATE DEHYDROGENASE (LDH) ACTIVITY IN FLIGHT MUSCLE EXPOSED TO SIMULATED MICROGRAVITY, **W. Ryan Owens**, Acchia NJ Albury, Rush H. Oliver, Larry L. Lowe, and Timothy A. Mousseau, Dept. of Biology, Chemistry and Environmental Health Sciences, Benedict College, and Dept. of Biology, USC Columbia

2:10 - 2:30 PM

GALECTIN-3 IS DIFFERENTIALLY MODULATED BY 17BETA-ESTRADIOL AND TAMOXIFEN IN HUMAN BREAST CANCER MCF-7 CELLS, **Bolanle Balogun**, Leeann Nelson, John Rollinson, Samir Raychoudhury, and Holly LaVoie<sup>1</sup> Dept. of Biology, Chemistry and Environmental Health Science, Benedict College, <sup>1</sup>Dept. of Cell and Developmental Biology and Anatomy, USC School of Medicine

2:30 - 2:50 PM

EXPRESSION AND ACTIVITY OF GAMMA-AMINOBUTYRIC ACID RECEPTOR (TYPE A) IN PROSTATE CANCER, **Shawntae McCray**, Mansoor Abdul, and Naseema Hoosein, Dept. of Biology, Claflin University

2:50 – 3:05 PM Break

3:05 – 3:25 PM

EFFECTS OF PROTEASOME INHIBITION ON PROTEIN EXPRESSION IN BREAST CANCER, **Yanille Scott**, Anna-Lee Clarke, Ebony Maxwell and Rush H. Oliver, Dept. of Biology, Chemistry and Environmental Health Sciences, Benedict College,

3:25 - 3:45 PM

INVOLVEMENT OF UBIQUITIN-MEDIATED PROTEOLYSIS IN FLIGHT MUSCLE HISTOLYSIS, **Maritza Gil**, Irine Chepkoech, Acchia Albury and Rush Oliver, Dept. of Biology, Chemistry and Environmental Health Sciences, Benedict College, and Dept. of Biology, USC Columbia

3:45 – 4:05 PM

MCF-7 CELL PROLIFERATION – EFFECTS OF A SHORT-TERM TREATMENT BY 17BETA-ESTRADIOL AND TAMOXIFEN, **Latoya Jenkins** and Samir Raychoudhury, Dept. of Biology, Chemistry and Environmental Health Science, Benedict College

4:05 – 4:55 PM

HEMOCYTE ACTIVATION IN FLIGHT MUSCLE HISTOLYSIS, **Carolyn Damon**, Acchia Albury and Rush Oliver, Dept of Biology, Chemistry and Environmental Health Sciences, Benedict College and Dept. of Biology, USC Columbia

**FIELD BIOLOGY  
ACADEMIC CENTER (AC 362)  
PRESIDING: VERNON BEATY, MIDLANDS TECHNICAL  
COLLEGE, DHEC**

**Morning Session**

8:30 - 8:50 AM

SALINITY AFFECTING GARDENIA CUTTINGS, **Natasha Smiling**, **Cedric N. Shamley Jr.** and Ajoy Chakrabarti, Dept. of Biological and Physical Sciences, SC State University

8:50 - 9:10 AM

USING A WATER EFFECTS RATIO METHOD TO DETERMINE IF OUTFLOW FROM A MATURE CONSTRUCTED WETLAND WILL CHANGE THE BIOAVAILABILITY OF COPPER TO CERIODAPHNIA DUBIA, **Bradley L. Temple** and S. Michele Harmon, Dept. of Biology and Geology, USC Aiken



9:10 - 9:30 AM

TRANS-ATLANTIC MOVEMENT AND INTRODUCTION OF BACTERIA FROM AFRICA INTO ESTABLISHED CARIBBEAN ECOSYSTEMS, **Courtney E. Hagan**, David I. Nathan, Brian A. Nevius, G. Maureen Holley, and Garriet W. Smith, Dept. of Biology and Geology, USC Aiken

9:30 - 9:40 AM Break

9:40 – 10:00 AM

COMPARATIVE HISTOPATHOLOGY OF THE DIGENEAN TREMATODES INHABITING THE LUNGS AND URINARY BLADDER OF *RANA PIPIENS*, **Stephanie Newton**, Baye Williamson, and Edna Steele, Dept. of Biology, Converse College

10:00 – 10:20 AM

A PRELIMINARY STUDY OF THE VASCULAR FLORA AT CAPE HENLOPEN STATE PARK, DELAWARE, **R. Stalter**, M.H. Choo, O. Galeano, G. Grigoryan, N. Faqueer, E. Lamont, and T. Mujo, Dept. of Biological Sciences, St. Johns University

#### **Afternoon Session**

1:00 -1:20 PM

A PRELIMINARY STUDY OF THE ARKWRIGHT DUMP SITE/FOREST PARK NEIGHBORHOODS USING SMALL MAMMALS AS BIOINDICATORS, **Rene' M. Eslick**, Jason J. Schumm, Andrew M. Davis<sup>1</sup>, Meri Gerges, Dereck Adams, Alicia Ingerson, and David K. Ferris, Division of Natural Sciences and Engineering, USC Upstate, <sup>1</sup>Carleton College

1:20 -1:40 PM

GERMINATION PHYSIOLOGY OF OKRA AND MUSTARD SEEDS UNDER SALT, STRESS, **Julia Jones** and Ajoy G. Chakrabarti, South Carolina State University

1:40 - 2:00 PM

BACTERIA ASSOCIATED WITH THE CORAL ECHINOPORA IN THE INDIAN OCEAN, **Magdalena Piskorska**, Dept. of Biology, USC Columbia

2:00 - 2:20 PM

*OITHONA COLCARVA*, A COPEPOD SPECIES PUTATIVE INTERMEDIATE HOST FOR THE PHILOMETRIDS *PHILOMETRA OVERSTREETI* AND *PHILOMETROIDES PARALICHTHYDIS*, **Timothy Bryan** and Isaure de Buron, Dept. of Biology, College of Charleston

2:20 – 2:30 PM Break

2:30 - 2:50 PM

GEOGRAPHIC VARIATION IN THE MORPHOLOGY OF *HEMIDACTYLUS BOWRINGII* IN MYANMAR AND YUNNAN, CHINA, **Caleb D. McMahan** and George R. Zug<sup>1</sup>, Dept. of Biology, Erskine College, <sup>1</sup>Dept. of Vertebrate Zoology, National Museum of Natural History, Smithsonian Institution

2:50 - 3:10 PM

VASCULAR PLANT DIVERSITY WITHIN THE MIDDENDORF BEDS, **Brittney D. Ogez** and Douglas P. Jensen, Department of Biology, Converse College

3:10 - 3:30 PM

SEED PRODUCTION OF *SPARTINA ALTERNIFLORA* IN TWO SALT MARSHES, QUEENS COUNTY, NEW YORK, **R. Stalter**, M.H. Choo, M. Byer, N. Patel, H.Y. Vu, J. Soto and P. Nguyen, Dept. of Biology, St John's University

3:30 - 3:50 PM

A SURVEY OF BLOOD PARASITE PREVALENCE AND ASSOCIATIONS WITH BOVINE TUBERCULOSIS IN AFRICAN BUFFALO (*SYNCERUS CAFFER*), **Kimberly Kanapeckas**, Vanessa Ezenwa<sup>1</sup> and Anna Jolles<sup>2</sup>, Dept. of Biology, Erskine College, <sup>1</sup>Division of Biological Sciences, University of Montana, <sup>2</sup>Dept. of Zoology and Veterinary Science, Oregon State University College of Veterinary Medicine

3:50 - 4:05 PM Break

4:05 - 4:25 PM

VIABLE FUNGAL SPORES FROM AFRICAN DUST FOUND IN THE CARIBBEAN, **David I. Nathan**, Courtney Hagan, Brian A. Nevius, G. Maureen Holley, Garriet W. Smith, Dept. of Biology and Geology, USC Aiken

4:25 - 4:45 PM

POPULATION DYNAMICS OF A MONOGENEAN FOUND PARASITIZING THE ESOPHAGUS OF THE ATLANTIC CROAKER, *MICROPOGONIAS UNDULATUS*, IN THE SOUTH ATLANTIC BIGHT, **Brooke Herron** and Tiffany G. Baker, Biology Dept., College of Charleston

4:45 - 5:05 PM

THE VASCULAR FLORA AT SMALL DISTURBED SIDEWALK PLOTS, BROOKLYN, NEW YORK, **R. Stalter**, A. Batool, M.H. Choo, G. Grigoryan, and S. Truc, Dept. of Biology, St John's University

**MOLECULAR BIOLOGY**  
**ACADEMIC CENTER (AC 143) MARY ROBERTSON CONF. ROOM**  
**PRESIDING: TBA**

**Morning Session**

8:30 - 8:50 AM

CHARACTERIZATION OF A POLYCISTRONIC TRANSCRIPT IN LB400, **John Pierson** and James Yates, Dept. of Biology and Geology, USC Aiken

8:50 - 9:10 AM

COMPARISON OF PEROMYSCUS EEFA1 ELONGATION FACTOR EST WITH OTHER VERTEBRATES, **Oko Emole** and Jianguo Chen, Claflin University

9:10 - 9:30 AM

THE DISTRIBUTION OF PHOSPHOLIPASE C BETA 4 IN THE MOUSE LIVER CHANGES WITH TIME OF DAY, **Blakely Andrews**, Barbra Bannan, Elizabeth Meyer-Bernstein, and Pamela Riggs-Gelascon<sup>1</sup>, Dept. of Biology, <sup>1</sup>Dept. of Chemistry/Biochemistry, College of Charleston

9:30 - 9:40 AM Break

9:40 -10:00 AM

IDENTIFICATION OF POTENTIAL DRUG THERAPY TARGETS FROM *ENTAMOEBIA HISTOLYTICA*, **April Jakes**, **Jason Bethea**, Stefanie Baker and Lesly Temesvari<sup>1</sup>, Dept. of Biology, Erskine College, <sup>1</sup>Dept. of Biological Sciences, Clemson University

10:00 10:20 AM

A PHENOTYPE-BASED SCREEN TO IDENTIFY NEGATIVE REGULATORS OF CONIDIATION IN *FUSARIUM GRAMINEARUM*, **Lacey A. Parrott**, Ashley G. Kelly, Ashley D. Zearfoss, Christopher J. Howard, Joseph E. Flaherty, Larry Dunkle<sup>1</sup>, and Jin Rong Xu<sup>2</sup>, Dept. of Science and Mathematics, Coker College, <sup>1</sup>SDA-ARS, Crop Protection and Pest Control Research Unit, <sup>2</sup>Dept. of Botany and Plant Pathology, Purdue University

#### **Afternoon Session**

1:30 -1:50 PM

ROLE OF CATALASE IN THE MORAXELLA CATARRHALIS OXIDATIVE STRESS RESPONSE, **Richard J. Wallace**, Johari Jordan, Randall H. Harris, Claflin University

1:50 -2:10 PM

THE EFFECTS OF TRANSCRIPTION FACTORS AND AGENTS ON GENE EXPRESSION, **Yarbough Miller**, Lakesha Meredith, Ashley McClary, Katherine Harris, and Deborah R. Crawford, Division of Natural Sciences and Mathematics and General Studies, Morris College

2:10 – 2:35 PM

DEVELOPMENT OF A LUCIFERASE ASSAY FOR ANALYSIS OF ANTI-HIV, RIBOZYME ACTIVITY IN TISSUE CULTURE, **Cari Fritz-French** and William H. Jackson, Dept. of Biology and Geology, USC Aiken

2:35 – 2:55 PM

TRANSCRIPTION OF BPHB AND BPHC IN LB400, **Steven Walker**, and James Yates, Dept. of Biology and Geology, USC Aiken

2:55 – 3:10 PM Break

3:10 – 3:30 PM

THE ROLE OF OXYR IN THE OXIDATIVE STRESS RESPONSE OF MORAXELLA CATARRHALIS, **Jennifer Miller** and Randall H. Harris, Claflin University

3:30 - 3:50 PM

DESIGNING AND CLONING A HAMMERHEAD RIBOZYME TARGETED TO NUCLEOTIDE 571 OF THE HIV-1 GENOME, **Melinda McDonald** and William H. Jackson, Dept. of Biology and Geology, USC Aiken

3:50 – 4:10 PM

DESIGN AND CLONING OF AN ANTI-LTR 491 HAMMERHEAD RIBOZYME, **Elizabeth Harrison** and William H. Jackson, Dept. of Biology and Geology, USC Aiken

4:10 – 4:30 PM

ANALYSIS OF LB400 CHROMOSOMAL DELETIONS, **Tyesha Sanders** and James Yates, Dept. of Biology and Geology, USC Aiken

### **CHEMISTRY AND BIOCHEMISTRY ACADEMIC CENTER (AC 350)**

**PRESIDING: GREG MANCINI, MIDLANDS TECHNICAL COLLEGE**

#### **Morning Session I**

8:30 - 8:50 AM

TOWARDS AN OVEREXPRESSION SYSTEM FOR THE ENZYME MANGANESE CATALASE FROM LACTOBACILLUS PLANTARUM, **Alix Grimley** and Pamela Riggs-Gelasco, Dept. of Chemistry, College of Charleston

8:50 - 9:10 AM

FORENSIC DISCRIMINATION OF BALLPOINT PEN INK USING UV/VISIBLE MICROSPECTROPHOTOMETRY AND MULTIVARIATE STATISTICS, **Amanda Kesler**, Dept. of Chemistry and Biochemistry, USC Columbia

9:10 - 9:30 AM

Development of Analysis for Mercury in Bird Feathers Using Ocean Optics USB2000 Spectrometer, **Winn Dadds** and James E. Spell, Dept. of Biological and Physical Science, Columbia College

9:30 - 9:40 AM Break

9:40 - 10:00 AM

17-BETA HYDROXYSTEROID DEHYDROGENASE ACTIVITY IN THE CORPORA LUTEA OF PREGNANT PIGS, **Samuel L. Strachan** and Rush H. Oliver, Dept. of Biology, Chemistry and Environmental Health Sciences, Benedict College

10:00 - 10:20 AM

DIPHENYLACETIC ACID AMIDES: NEW INDICATORS FOR STRONG BASES, N. Willis, **L. Nesbit**, O. Sotola and D. Magnin, Division of Natural Sciences and Mathematics, Morris College

**CHEMISTRY/ BIOCHEMISTRY II**  
**ROOM: TBA**  
**PRESIDING: TBA**

**Morning Session**

8:30 - 8:50 AM

METAL SPECIFICITY OF THE RIBONUCLEOTIDE REDUCTASE FROM *CORYNEFORM AMMONIAGENES*, **Amy Rhoden**, Ryan Yonce, Matt Williams, Pamela Riggs-Gelasco, Dept. of Chemistry, College of Charleston

8:50 - 9:10 AM

CHARACTERIZATION AND PARTIAL PURIFICATION OF ACID PHOSPHATASE ACTIVITY IN FLIGHT MUSCLE HISTOLYSIS, **Stanley Davis**, Acchia Albury, and Rush Oliver, Dept. of Biology, Chemistry and Environmental Health Sciences, Benedict College, and Dept. of Biology, USC Columbia

9:10 - 9:30 AM

SYNTHESIS OF A NEW DERIVATIVE OF THE ANTIBIOTIC CYTOSPORONE E: THE BEGINNING OF A SAR STUDY, **Michael Stephens** and Justin K. Wyatt, Dept. of Chemistry and Biochemistry, College of Charleston

9:30 - 9:40 AM Break

9:40 -10:00 AM

ANALYSIS OF BLOOD ON SUBSTRATES OF FORENSIC RELEVANCE BY FOURIER-TRANSFORM INFRARED (FT-IR) SPECTROSCOPY, **Heather Taylor**, USC Columbia

10:00 - 10:20 AM

STRONG BASE SYNTHESIS OF SYMMETRICAL TRIKETONES, **John D. Knight**, Clyde R. Metz, Charles F. Beam, William T. Pennington<sup>1</sup> and Donald G. VanDerveer<sup>1</sup>, Dept. of Chemistry and Biochemistry, College of Charleston, <sup>1</sup>Dept. of Chemistry, Clemson University

**Afternoon Session**

1:30 -1:50 PM

INCREASING THE BASIC CHARACTER OF THE ANTIBIOTIC CYTOSPORONE E, **Stefan M. Cooper Jr.**, and Justin K. Wyatt, Dept. of Chemistry and Biochemistry, College of Charleston

1:50 - 2:10 PM

STUDIES OF THE SUZUKI-MIYaura CROSS-COUPling BETWEEN BENZYL 3,5-BIS(BENZyLOXY)-4-BROMOBENZOATE AND POTASSIUM VINYLTRIFLUOROBORATE UNDER THERMAL AND MICROWAVE PROMOTED CONDITIONS, **Dena R. Hodges**, Stefan M. Cooper Jr., and Justin K. Wyatt, Dept. of Chemistry and Biochemistry, College of Charleston

2:10 - 2:30 PM

SYNTHESIS OF AN "ALKYL IMIDAZOLE" INHIBITOR OF AP2: A NEW APPROACH FOR DIABETES TREATMENT, **Richard Mason**, M. Perry Davis Jr., and D. Magnin, Division of Natural Sciences and Mathematics, Morris College

2:30 - 2:50 PM

FURTHER DEVELOPMENT OF A NOVEL APPROACH TO CONTROLLING THE DIASTEREOSELECTIVITY OF THE MEYERS ORTHO-ALKYLATION OF CHIRAL AROMATIC OXAZOLINES, **Gregory N. Goschy**, William M. King, and Justin K. Wyatt, Dept. of Chemistry and Biochemistry, College of Charleston

2:50 - 3:15 PM Break

3:15 – 3:35 PM

SYNTHESIS OF A COMMON INTERMEDIATE TO DEVELOP ANALOGS OF THE ANTIBIOTIC CYTOSPORONE E, Megan A. Callanan, **Elizabeth H. Flynn**, and Justin K. Wyatt, Dept. of Chemistry and Biochemistry, College of Charleston

3:35 - 3:55 PM

CHARACTERIZATION OF A HIGH-VALENT IRON INTERMEDIATE THAT ACCUMULATES DURING ENZYMATIC HALOGENATION REACTIONS, **Ryan Yonce** and Pamela Riggs-Gelasco, Dept. of Chemistry, College of Charleston

3:55 – 4:15 PM

STRONG BASE SYNTHESIS OF AROYLACETONES, PHENACYLTHIOCHROMONE, PHENACYLQUINOLINONES AND RELATED COMPOUNDS, **Luan Q. Do**, Anna C. Dawsey, John D. Knight, and Charles F. Beam, Dept. of Chemistry and Biochemistry, College of Charleston

4:15 - 4:35 PM

STRONG BASE SYNTHESIS OF PYRAZOLYL-ORTHO-BENZENESULFONAMIDES WITH C(ALPHA),N-HYDRAZONES AND METHYL 2-(AMINOSULFONYL)BENZOATE, **Anna C. Dawsey**, Luan Q. Do, John D. Knight, Clyde R. Metz, Charles F. Beam, William T. Pennington<sup>1</sup>, Donald G. VanDerveer<sup>1</sup> and N. Dwight Camper<sup>2</sup>, Dept. of Chemistry and Biochemistry, College of Charleston, <sup>1</sup>Dept. of Chemistry, <sup>2</sup>Dept. of Entomology, Soils, and Plant Diseases, Clemson University

4:35 – 4:55

EFFECT OF PLASMID DNA SHAPE ON BINDING TO PROTEIN-SIZED METAL NANOPARTICLES, **Katie Glenn**, Allison Serdah, and Latha Gearheart, Dept. of Chemistry, Presbyterian College

**PUBLIC HEALTH  
ACADEMIC CENTER (AC 351)**

**PRESIDING: DONA CROCKER, MIDLANDS TECHNICAL COLLEGE**

**Afternoon Session**

1:20 - 1:40 PM

ANALYSIS OF SOUTH CAROLINA CENTRAL CANCER REGISTRY BREAST CANCER DATA: UNDERSTANDING RACIAL DISPARITIES, Joan Cunningham and **Stephanie Cooper**<sup>1</sup>, South Carolina Cancer Center, <sup>1</sup>Dept. of Biology, Claflin University

1:40 - 2:00 PM

HEALTH ASSESSMENT OF WOMEN LIVING WITH AIDS IN KENYA, **Ashlee Riggs**, Pearl Fernandes, John Mecham<sup>1</sup>, and Michael Otieno<sup>2</sup>, Division of Science, Mathematics and Engineering, USC Sumter, <sup>1</sup>Department of Biology and Health Sciences, Meredith College, <sup>2</sup>Kenyatta University

2:00 - 2:20 PM

INTERNET USE FOR MEDICAL PURPOSES, **Raphael (Leon) Richardson** and Janice C. Probst<sup>1</sup>, Claflin University, <sup>1</sup>USC Columbia

2:20 – 2:30 PM Break

2:30 - 2:50 PM

A SYSTEMATIC EVALUATION OF HPV VACCINE EDUCATIONAL MATERIALS, **Beverlee Blanchard**, Heather M. Brandt<sup>1</sup>, and James R. Hebert<sup>1</sup>, Claflin University, <sup>1</sup>USC Columbia, Cancer Prevention & Control Program

2:50 - 3:10 PM

BACTERIAL CONTAMINANTS IN PAU D'ARCO AND BLACK COHOSH, **Lanika D. Martin**, Melissa B. Riley, and Sandra L. Gray, Dept.s of Biological Science, Entomology, Soil and Plant Sciences, and Animal & Veterinary Science, Clemson University

3:10 - 3:30 PM

INTERVENTIONS FOR IMPROVING THE HEALTH OF HIV INFECTED PERSONS, **Robert Bryant**, Lateisha Tiller, Vernesha Brooks and Gregory Hand<sup>1</sup>, Claflin University, <sup>1</sup>USC Columbia

**PHARMACY  
ACADEMIC CENTER (AC 351)  
PRESIDING: TBA**

**Morning Session**

8:30 – 8:50 AM

ALTERNATIVE COLLECTION PROTOCOL FOR SEMEN ANALYSIS: OVERNIGHT SEMEN COLLECTION KIT, **J. Glenn Proctor**, H. Lee Higdon III, and William R. Boone, Dept. of Obstetrics and Gynecology, Div. of Reproductive Endocrinology and Infertility, Greenville Hospital System University Medical Center

8:50 – 9:10 AM

MICROBIAL CONTAMINATION AND BIOLOGICAL ACTIVITIES OF CAT'S CLAW AND BLUE COHOSH HERBAL PRODUCTS, **Angela V. Covington**, Melissa Riley, and Sandra Gray, Dept.s of Biological Sciences, Entomology, Soils and Plant Sciences, and Animal and Veterinary Sciences, Clemson University

9:10 – 9:30 AM

Assessing the Biological Activity of Downy Rattlesnake Plantain (*Goodyera pubescens*) **Robert Lee Sanders** and Jane Ellis, Department of Biology, Presbyterian College

9:30 – 9:40 AM Break

9:40 – 10:00 AM

CONTAMINATION OF LICORICE AND GINGER ROOT HERBAL PRODUCTS,  
**Javan Smith III**, Melissa Riley, and Sandra Gray, Dept. of Biological Sciences,  
Entomology, Soils and Plant Sciences and Animal and Veterinary Sciences, Clemson  
University

10:00 – 10:20 AM

EFFECT OF THAW TEMPERATURE ON MURINE BLASTOCYST DEVELOPMENT,  
**Heather M. Barton**, H. Lee Higdon III<sup>1</sup>, Jennifer E. Graves-Herring<sup>1</sup>, and William R.  
Boone<sup>1</sup>, Dept. of Animal and Veterinary Sciences, Clemson University, <sup>1</sup>Dept. of  
Obstetrics and Gynecology, Div. of Reproductive Endocrinology and Infertility,  
Greenville Hospital System University Medical Center

**MATH AND COMPUTER SCIENCE  
ACADEMIC CENTER (AC 218)  
PRESIDING: KARIN BEATY**

**Afternoon Session**

1:20 -1:40 PM

A MODEL OF INTERNAL PATIENT FLOWS AND RESULTING NURSING UNIT  
OVERFLOWS IN A UNIVERSITY HOSPITAL, **Kyle Keepers** and Gary W. Harrison,  
Dept. of Mathematics, College of Charleston

1:40 - 2:00 PM

STATISTICAL PROCESS CONTROL TOOLS APPLIED TO ASSISTED  
REPRODUCTIVE TECHNOLOGY(ART), **Madhulika Kannuswamy**, Herman Senter,  
Xiaoqian Sun, H. Lee Higdon III<sup>1</sup>, and William R. Boone<sup>1</sup>, Dept. of Mathematics  
Sciences, Clemson University, <sup>1</sup>Dept. of Obstetrics and Gynecology, Division of  
Reproductive Endocrinology and Infertility, Greenville Hospital System University  
Medical Center

2:00 - 2:20 PM

DEAD RULERS TALKING, **Kristen Huete** and James McKim, Winthrop University

2:20 – 2:40 PM

IMAGES OF FEMALE PREPROFESSIONAL SCIENTISTS, **Allison Serdah**, Jane Ellis,  
Department of Biology and Anita Dutrow, Department of Education, Presbyterian  
College

**PHYSICS AND ASTRONOMY  
ACADEMIC CENTER (AC 113)  
PRESIDING: JEFF HOPKINS, MIDLANDS TECHNICAL COLLEGE**

**Afternoon Session**

1:20 -1:40 PM

REFLECTANCE MEASUREMENTS OF PHOTOSENSITIZED TISSUE PHANTOMS,  
**Daryl Reynolds**, Erik Johnstone, Jane Buchanan, Melinda Lee, Norris Preyer, and  
Linda Jones, Dept. of Physics and Astronomy, College of Charleston



1:40 - 2:00 PM  
OBSERVATION OF PARAMAGNETISM IN AU THIN FILMS THROUGH ORGANIC CHEMISORPTION, **Brad Knaus**, Dept. of Physics and Astronomy, USC Columbia

2:00 - 2:20 PM  
SYNTHESIS AND CHARACTERIZATION OF MULTILAYER  
 $\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_{1.85}\text{Ca}_N\text{Cu}_{2N+1}\text{O}_X$ , **Nathaniel Robinson** and Jafar Amirzadeh, Division of Natural Sciences and Mathematics, Morris College

2:20 – 2:30 PM Break

2:30 - 2:50 PM  
MAGNETIC OBSERVATION MAGNETIC OBSERVATION OF NI NANOMAGNETS, **Longfei Ye**, Dept. of Physics and Astronomy, USC Columbia

2:50 - 3:10 PM  
PROS AND CONS OF COMBINING DATA FROM TWO TELESCOPES TO AID IN FREQUENCY DETERMINATION OF PULSATING STARS, **Melissa L. Sims** and Robert J. Dukes Jr., Dept. of Physics and Astronomy, College of Charleston

3:10 - 3:30 PM  
THE USE OF MAGNETIC RECORDING FOR NANOSCALE METROLOGY, **Robert Heaton** and Thomas Crawford, Dept. of Physics, USC Columbia

3:30 - 3:45 PM Break

3:45 - 4:05 PM  
SLOWLY PULSATING B STARS: APT VERSUS MERCATOR RESULTS, **Joseph L. Bramlett III** and Robert J. Dukes Jr., Dept. of Physics and Astronomy, College of Charleston

4:05 - 4:25 PM  
PHOTOELECTRIC EFFECT. INTERDISCIPLINARY OUTLOOK, **Mikhail M. Agrest**, Physics and Astronomy Dept., College of Charleston

**GEOLOGY, GEOGRAPHY, PSYCHOLOGY, SOCIAL SCIENCES  
ACADEMIC CENTER (AC 104)  
PRESIDING: TBA**

**Afternoon Session**

1:20 - 1:40 PM  
SOME NEWSPAPERS IN AMERICA ARE “GETTING IT”—SWITCHING FROM NEWS AND INFORMATION AS LECTURE TO CONVERSATION: INSIGHTS FROM JOURNALIST BLOGGERS ABOUT WHAT THEY DO, HOW THEY DO IT AND WHY, **Larry Timbs**, Dept. of Mass Communication, Winthrop University

1:40 - 2:00 PM  
COMPARATIVE EFFECTS OF SEA LEVEL RISE VERSUS MAJOR HURRICANE EVENTS ON THE DRAMATIC EROSION OF SAKONNET POINT, RHODE ISLAND, **John B. Williams**, Dept. of Biological & Physical Sciences, SC State University

2:00 - 2:20 PM

A STELLA II MODEL OF THERMOHALINE OCEAN CIRCULATION, **Claire duPont**  
and Laney Mills, Dept. of Physics and Astronomy, College of Charleston

2:20 - 2:40 PM

RUSSIA' RAILROADS: LESSONS FROM AMERICA-PART 3 LESSONS LEARNED,  
**Clinton H. Whitehurst, Jr.**, Strom Thurmond Institute, Clemson University

**POSTER PRESENTATIONS**  
**8:30- 10:20 AM**  
**ACADEMIC CENTER LOBBY**  
**PRESIDING: DR. HANS-CONRAD ZUR LOYE**

*PRESENTERS ARE REQUIRED TO BE AT THEIR POSTER STATION FROM  
8:30AM - 10:20AM. POSTERS MAY BE REMOVED AFTER 1:00 PM.*

- 01 DR. G.C. MANCE AND THE HISTORY OF THE SOUTH CAROLINA ACADEMY OF SCIENCE, David J. Stroup, Francis Marion University
- 02 LONGITUDINAL ANALYSIS OF VICTIMIZATION AND PROBLEM ALCOHOL USE IN ADOLESCENTS, Martie Thompson, Laney Sims<sup>1</sup>, and Michael Windle<sup>2</sup>, Dept. of Public Health, <sup>1</sup>Dept. of Mathematical Sciences, Clemson University, <sup>2</sup>Dept. of Public Health, Emory University
- 03 A BREATH OF FRESHWATER: THE EFFECTS OF WASTE WATER EFFLUENT ON WATER QUALITY, Dedrick Tribble, Pearl R. Fernandes, Jeffrey Steinmetz, Division of Science, Mathematics and Engineering, USC Sumter
- 04 HAIRLESS FOXES OF THE LOWCOUNTRY: MYSTERY ANIMALS' IDENTITY CONFIRMED, Amanda Jenkins and Jaap Hillenius, Dept. of Biology, The College of Charleston
- 05 CHRONIC TOXICITY TESTS ON STORMWATER FROM A NORTH AUGUSTA, SC WATERSHED, Brandon Hall and S. Michele Harmon, Dept. of Biology and Geology, USC Aiken
- 06 THE EFFECT OF AQUAPORIN 3 AND ORAL GLYCEROL APPLICATIONS ON WOUND HEALING IN MICE, Brandie Howell, Phillip Strickland, Wendy Bollag, and Xiaofeng Zhong, Dept. of Regenerative Medicine, Medical College of Georgia
- 07 THE ROLE OF THROMBOMODULIN IN PROSTATE TUMOR CELL MIGRATION, Shereen Mehrem, Chris Teigland<sup>1</sup>, and Laura Glasscock, Dept. of Biology, Winthrop University, <sup>1</sup> Dept. of Urology, Carolinas Medical Center
- 08 IDENTIFICATION OF TWO TAGGED-INSERTIONAL MUTANTS OF FUSARIUM GRAMINEARUM IMPAIRED IN ASEXUAL REPRODUCTION, Ashley D. Zearfoss, Ashley G. Kelly, Joseph E. Flaherty, Larry Dunkle<sup>1</sup>, and Jin-Rong Xu<sup>2</sup>, Dept. of Science and Mathematics, Coker College, \*USDA-ARS, Crop Protection and Pest Control Research Unit, <sup>2</sup>Dept. of Botany and Plant Pathology, Purdue University
- 09 DESIGN AND CLONING A HAMMERHEAD RIBOZYME TARGETED TO VPU6077, Amanda Gerolstein and William H. Jackson, Dept. of Biology and Geology, USC Aiken
- 10 CLONING OF A HAMMERHEAD RIBOZYME TARGETED TO THE HIV-1 VIRION INFECTIVITY FACTOR, Audrey Hendley and William H. Jackson, Dept. of Biology and Geology, USC Aiken

- 11 THE ROLE OF SUFA IN FE-S CLUSTER ASSEMBLY, Kenneth Nesbitt, Vibha Gupta, and Wayne Outten, Dept. of Chemistry and Biochemistry, USC Columbia
- 12 COMPARISON OF SOURCES OF FINE PARTICULATE MATTER AT COASTAL CAROLINA UNIVERSITY, Kimberly Englehart and Darlene L. Slusher, Coastal Carolina University
- 13 SYNTHESIS OF ALKYNLATED AMINO ACIDS FOR USE IN 1,3-DIPOLAR CYCLOADDITION REACTIONS, Karmella Fullard, Robin Fulton, Jessica Green, and Diana Rishmawi and Kris Varazo, Francis Marion University
- 14 HURRICANES AND THE COLLAPSE OF THE SOUTH CAROLINA RICE, CULTURE, J. Everett Spell and Martha M. Griffin, Dept. of Biological and Physical Science, Columbia College
- 15 HEART RATE VARIABILITY AS AN INDICATOR OF ACUTE STRESS USING THE STROOP TEST, Jonathan R. Williams and John B. Williams<sup>1</sup>, Science Dept., Midlands Technical College, <sup>1</sup>Dept. of Biological & Physical Sciences, SC State University
- 16 RELATIONSHIPS BETWEEN RELATIVISTIC JET ORIENTATIONS AND BLACK-HOLE ACCRETION DISKS, Christopher Lindner and P. Chris Fragile, Dept. of Physics & Astronomy, College of Charleston
- 17 TISSUE PHANTOM FOR PHOTSENSITIZER QUANTIFICATION, Jane Buchanan, Eric Johnstone, Melinda Lee, Daryl Reynolds, Linda Jones and Norris Preyer, Dept. of Physics and Astronomy, College of Charleston
- 18 CERAMIC CAPACITORS FOR CRYOGENIC NMR RF CIRCUITS, David L McCree, Dept of Physics and Astronomy, USC Columbia

## SOUTH CAROLINA JUNIOR ACADEMY OF SCIENCE

### MEETING ABSTRACTS

#### DE-COUPLED PLAINER INVERTED F ANTENNAS FOR DIVERSITY PERFORMANCE IN MOBILE PHONES

Archie Adams

South Carolina Governor's School for Science and Mathematics

Mentor: Dr. Mohammed Ali, University of South Carolina

Antenna diversity is a well-known technique to enhance the performance of wireless communication systems by reducing the distortions of the channel. In order to create an antenna diversity system on a wireless device, two or more miniaturized antenna elements could be placed in positions that provide uncorrelated signals so that when they are combined according to a diversity technique such as switched, or MIMO diversity, or combined diversity, in order to create an improved signal. In combining diversity schemes, signals from all the antenna branches at any instant in time are weighed, cophased, and summed to provide a better received signal and therefore an improved performance. The planar inverted-F internal antenna (PIFA) with fractal meandered line structure has gained much interest and due to its compact and low profile, ease of fabrication, and low cost [I cut this –MG] is a potential candidate for Diversity performance. Two planar inverted meandered line F antennas were investigated at 1920 MHz to demonstrate the feasibility for switched and combined diversity performances. Diversity test were completed and the collected data supported the results that were expected. The most efficient antenna setup found was a mirror placement, which involves two Hilbert PIFA's that are positioned on the ground plain across a slot that has been cut between them. This antenna placement produced –22 dB of coupling, which is significantly, better than the –11 dB of coupling in most cell phone antennas. These results have lead, in other similar studies, to the invention of better cell phones.

#### CAN THE CONCEPT OF EQUILIBRIOCEPTION BE APPLIED IN ROBOTICS?

Arjun Aggarwal

Pleasant Hill Middle School

The intent of this study was to determine if by using the concept of equilibrioception, a bipod robot could balance itself. The research was divided into four main parts. First objective was to know more about equilibrioception. Second objective was to construct a simple bipod robot with Lego parts. Third objective was to write a computer program for balancing a bipod robot. If a simple bipod robot could be constructed and balanced, then the final objective was to test its stability under different conditions. Equilibrioception or sense of balance is one of the physiological senses. It allows humans and animals to walk without falling. It was found that various sensors can be used in multiple ways to act as senses of a robot. For the purpose of the experiment, a simple robot was constructed with Lego Mindstorm Kit. The robot had two wheels connected to a motor, which were mounted on the RCX brick of the Lego Mindstorm kit. An algorithm was derived. Programming flowcharts and pseudo code were written for programming the robot. The robot was tested under various conditions for stability. This experiment along with further research on equilibrioception & current technologies of autonomous robotic

navigation confirm that concept of equilibrioception can and is being effectively applied for autonomous robotic navigation. It was also found that a light sensor would not be the best sensor for balancing a bipod robot.

#### HOW STATE OF MIND AFFECTS CORTICAL EXCITABILITY AND REDUCTION OF TMS INDUCED PAIN THROUGH METAL SHIELDS

Millie Ann Agrawal

South Carolina's Governor's School for Science and Mathematics

Mentor: Dr. Mark George, Medical University of South Carolina

TMS, transcranial magnetic stimulation, is a new alternative method of treatment for psychological disorders. In the Brain Stimulation Lab at MUSC, it is being used as an effective treatment for depression. Since TMS was only developed in the 1980s, there is still much unknown about it, such as how your thoughts affect the treatment. For the first part of this study, we determined if mental activity and awareness affected the treatment. The subject's MT, motor threshold, was taken and compared under four conditions: eyes open or closed, and thinking about movement or a stationary object. This study showed that mental activity does affect your MT, but not a significant amount. The second part of this study was testing a method to reduce the pain experienced during TMS. One theory is that pain is caused by magnetic loops hitting nerves in the face and can be stopped by placing metal shields over sections of the face. For this study, subjects rated pain and other sensations after receiving treatment under four conditions: with real or placebo shields, and at 100% or 120% of their MT. This study showed that the plates have no real affect on the level of pain felt.

#### THE EFFECT OF GREEN TEA EPIGALLOCATECHIN-3-GALLATE (EGCG) ON THE ABILITY OF P25-ACTIVATED CYCLIN-DEPENDENT KINASE 5 (CDK5) TO INDUCE CELL DEATH IN COS-7 KIDNEY CELLS: IMPLICATIONS FOR ALZHEIMER'S DISEASE

Shivani B. Agarwal

Spring Valley High School

Recently, it has been shown that Japan's elderly had a lower risk of developing Alzheimer's than those in Western Europe and the United States (Green tea may protect the aging brain, 2006) and other researchers found that certain concentrations of EGCG protected neurons from  $\beta$ -amyloid-induced death (Bastianetto, 2006). The purpose of the current study was to determine whether EGCG was neuroprotective in its interaction with the toxic p25-cdk5 pathway that is linked to the amyloid hypothesis of Alzheimer's disease. The timing of EGCG application was also studied in order to determine when it would be most beneficial to the cos-7 kidney cells, and at what concentration of EGCG cell survival would be the highest. First, the concentration at which p25-cdk5 was most toxic and at what time the pathway would induce cell death were tested. Next, the effects of the concentration of and time at which EGCG was applied on the ability of p25-activated cyclin-dependent kinase 5 (cdk5) to induce cell death were studied. It was hypothesized that EGCG, when applied at 10 mM at the time of transfection, would be most neuroprotective to the cos-7 cells, meaning that fewer cells would demonstrate cell death. Multiple  $\chi^2$  tests for independence showed that the p25-cdk5 pathway was extremely harmful to the cells and is possibly a cause factor of Alzheimer's. Furthermore, the concentration of EGCG was shown to determine the health of cells with the highest concentration, 10 mM, allowing the cells to have the highest survival rate.

ANTI-BACTERIAL ACTION OF PHOTOCATALYZED  $\text{TiO}_2$   
Gordon Alexander  
Spring Valley High School

The most universal technique for sterilizing water in well-developed countries is chlorination. Chlorine is quite useful for killing most receptive organisms, but is highly ineffective for killing nearly all pathogens. In addition, research has found that chlorine leaves unnecessary disinfection by-products or DBS. Due to this problem, the US Environmental Protection Agency (EPA) has begun looking for alternative techniques to disinfect water. Currently investigated techniques include the use of UV light and colloidal  $\text{TiO}_2$  to disinfect water. It was hypothesized that ultraviolet radiation and the  $\text{TiO}_2$  could be used in a flow-through water apparatus to sterilize water. Flasks of water containing differing microbes were put through a flow-through apparatus and collected on the other side in a clean flask. Samples were collected from the receiving flask and grown on agar plates. Dependent samples t-Tests were performed to determine whether there was a mean significant difference between the “before” water and the “after” water. One of the three bacteria tested showed a difference, although. A one-way analysis of variance was conducted to find out if the different bacteria death rates were considerably different from each other. No significant difference was found to be present between any of the groups.

TRANSLOCATION OF GFP-TUBBY PROTEINS THROUGH ACTIVATION OF  
GROUP I MGLU RECEPTORS IN HEK293 CELLS

Katelyn J. Barzee  
South Carolina Governor’s School for Science and Mathematics  
Mentor: Dr. John Woodward, MUSC Department of Neuroscience

The daunting obesity epidemic has created a serious need to explore obesity’s genetic roots. One murine obesity model has revealed that loss of function of tubby proteins leads to the apoptosis of many neurons, including those in the appetite-controlling hypothalamus. A recent study by Dr. Foster Olive, MUSC Dept. of Psychiatry and Behavioral Sciences shows that activation of metabotropic Ach receptors in hippocampal neurons triggers the relocation of tubby proteins. Tubby has also been found in hippocampal neurons that do not possess metabotropic ACh receptors, but that have a high number of metabotropic glutamate receptors (mGluRs). This study tested the hypothesis that group I mGluRs also induce translocation of tubby. HEK293 cells were transfected with GFP-Tubby and mGluR1 or mGluR5 and treated for various times with the group I agonist DHPG. Cells were fixed and nuclear staining was carried out using Hoescht 33258. Using confocal microscopy, both the green fluorescence of tubby tagged with GFP and the blue fluorescence of nuclear stain Hoescht 33258 were captured, and the images were overlaid. Analysis of the images suggests that activation of group I mGluRs triggers a re-distribution of tubby from the plasma membrane to the nucleus.

DO, RE, MI- THE EFFECT OF CLASSICAL MUSIC ON SPATIO-TEMPORAL  
REASONING OF DIFFERENT AGED PEOPLE

J. Kasey Bates  
Walhalla High School

The Mozart Effect is best known to the public through Don Campbell’s book, *The Mozart Effect*. Much research has been conducted on this and it is questioned whether listening to certain kinds of classical music may induce a short-lived improvement on spatio-temporal reasoning. The experiment was conducted in order to determine the effect of

classical music on spatio-temporal reasoning on different aged test takers. It was hypothesized that if classical music is played then spatial intelligence will increase regardless of a person's age.

Three people were chosen in each age group (yrs) to take both test one and test two, consist of 15 questions. Test one was given in complete silence while test two was taken with Mozart playing in the background. Similarly, scores (%) were calculated for each age group, 20-50, 50-60, and over 60.

The purpose of this experiment was to determine whether classical music, Mozart, had a dramatic effect on the spatio-temporal reasoning of different aged people. I tested twelve human subjects, three in each of the four age groups. Each individual's test score improved with Mozart's music being played in the background except for three. I hypothesized that test scores would be incredibly higher with Mozart's classical music being played in the background and that age would be of no difference. My data supported my claim. Professional research has been done on this topic through many college studies, and this concept has come to be called the "Mozart Effect."

#### STATISTICAL SIGNIFICANCE AND TRENDS AMONG HYPERGLYCEMIC SYMPTOMS, HYPOGLYCEMIC SYMPTOMS, PSYCHOSOCIAL SYMPTOMS AND BLOOD GLUCOSE LEVELS IN TYPE 2 DIABETICS

Amanda Beckham

South Carolina Governor's School for Science and Mathematics  
Mentor: Dr. William Riner, University of South Carolina-Lancaster

Type 2 Diabetes Mellitus (DM) is a disease that more than 6 million people in the United States suffer from. The bodies of these people fail to properly use insulin. There are two types of symptoms that a diabetic can experience. These are hypoglycemia and hyperglycemia. Hypoglycemia, or low blood sugar, occurs occasionally to everyone who suffers from diabetes. Some of the symptoms of hypoglycemia include: shaking, dizziness, sweating, confusion, and seizures. Hyperglycemic, or high blood sugar, is a major cause of many of the complications that occur to people who have type 2 DM. The symptoms and signs of hyperglycemia include but are not limited to: frequent urination, increased thirst, nausea, visual changes, deep breathing, weight loss, and frequent infections. Many studies have been conducted to try and determine which parameters of a diabetic's lifestyle have correlations with their blood glucose levels. The purpose of this study was to gather data from patients at the Diabetes Education Clinic and to run statistical tests on the data. Many parameters were tested against the patients' blood glucose levels. Most of our data supported the studies done by other scientists, however the physical activity showed up as not significant, and in every other study it showed significance with the blood glucose levels.

#### DETERMINATION OF THE EFFICACY OF COMMERCIALY AVAILABLE SNAKE REPELLENTS ON COMMONLY OCCURRING SNAKES

Sarah Blanton

South Carolina Governor's School for Science and Mathematics  
Mentor: Tony Mills, Savannah River Ecology Laboratory

The snake vomeronasal system is a complex portion of the sensory system essential to a snake's survival. The system processes various pheromones or other chemical cues present in the immediate area to provide a type of image, which is important because snakes have a relatively poor sense of vision. Chemicals enter the system when a snake tongue flicks and particles attach to the tongue then further enter the Jacobson's organ



via one of several hypothesized methods. These chemicals are further processed in different areas of the brain and are possibly responsible for the rate at which the tongue flicks. It is through this sensory system that a snake processes the chemicals present in various repellents. Three different treatments were chosen for this study; Snake-A-Way Snake Repellent, Liquid Fence Snake Repellent, and Snake Stopper Snake Repellent. Four identical test enclosures were constructed to conduct experiments to determine the efficacy of the three repellents. Nine species of commonly occurring snakes, including venomous and nonvenomous, were chosen for the experiments. The study observed snake behaviors as each individual encountered the various repellents. The rate of tongue flicks and any form of hesitation were recorded as well as the time each snake took to cross the repellents. Data were analyzed to further determine if the repellents were statistically more effective than a control.

#### THE EFFECT OF GENDER AND ENVIRONMENT ON THE NUMBER OF PEOPLE THAT ARE INTROVERTS AND EXTROVERTS

Patrick Branson  
Walhalla High School

Introverts are people who are not very social and extroverts are people that are very social. Learning that extroverts will show more hand gestures than introverts was a very important step to this project. The purpose of this experiment was to find out that majority of females are extroverts in a group and the majority of males are introverts. Extrovert people seem to give more hand gestures. It was hypothesized that if the majority of females are extroverts in a group then the majority of males are introverts. My hypothesis in the home environment was incorrect because there were more males that were extroverts than introverts. There were 3 males that were extroverts and there were only two and a half females because one female thought she was between. On the party environment the hypothesis was supported because there more extroverts in females than there are in males. There were 5 females that were extroverts and 4 males that were extroverts.

#### TRANSCRIPTIONAL REGULATION OF *ARABDOPSIS* CALCIUM DEPENDENT PROTIEN KINASE BY ABIOTIC STRESS

John Brock  
South Carolina Governor's School for Science and Mathematics  
Mentor: Dr. Shua Hua Cheng, Clemson University

Calcium is a ubiquitous second messenger in eukaryotic signal transduction cascades. Various abiotic stress signals, such as cold, salinity, and drought are known to increase intracellular  $Ca^{2+}$  levels in plants. Calcium-dependent protien kinases (CDPKs) are major plant  $Ca^{2+}$  sensors and are implicated in plant's responses to abiotic stress. The goal of this project is to determine if certain abiotic stresses, play a role in regulating the transcription of an Arabdopsis CDPK (AtCPK30). AtCPK30 is named because it was the thirtieth CDPK discovered in *Arabdopsis*. Since,  $Ca^{2+}$  concentration increases in drought, cold and salty conditions, we believed that all three factors would affect the transcription of AtCPK30. Transgenic plants expressing a 2.8Kb CPK30 promoter, fused with a reporter gene (GUS) were used to achieve this goal. After subjecting the plants to treatments of cold ( $4^{\circ}C$ ), salinity (200mM table salt) and drought (200mM mannitol), the activity of GUS was measured with a flourometer. The results indicated that the CPK30 gene is transcriptionally activated by salinity and drought, but not cold temperature.

OPTIMIZATION OF THE TOTAL ELECTROSTATIC ENERGY AND ITS  
COMPONENTS IN PROTEIN-PROTEIN COMPLEXES

Kelly Brock

South Carolina Governor's School for Science and Mathematics

Mentor: Dr. Emil Alexov, Clemson University

Electrostatic interactions are one of the major forces responsible for the stability of proteins and protein-protein complexes. They play a significant role in causing separate monomers to associate into a complex, which forms an interface between monomers. Amino acids within this interface interact with each other and contribute to the stability of the complex. This project investigated the degree of optimization of the total electrostatic energy and its components in the large set of protein-protein complexes. Three hundred proteins were tested using computer modeling; almost all of the statistical z-scores indicated that the energy of the associated complexes was optimized. The findings of this study are being used to choose the most accurate model of the 3D structure of a protein-protein complex.

ENVIRONMENTAL CHANGES OF THE CONGAREE FLOODPLAIN AS  
DETERMINED BY PALYNOLOGY AND PEAT PH

Elizabeth A. Cannon

South Carolina Governor's School for Science and Mathematics

Mentor: Dr. Art Cohen, University of South Carolina

Peat from Congaree National Park was studied for pH and palynology. For pH, peat samples at various depths from three cores in the Muck Swamp equilibrated in water before recording pH. Overall, the pH tended to be acidic throughout the core with the lowest pH at the surface and rising towards neutral as the samples were taken from greater depths. Another part of the study focused on palynology. Pollen that settles in the peat is very hardy and may be extracted for study. Using palynology, sixty-three varieties of plants in the area at various times in geologic history were counted and recorded for CON-4, a site in the Congaree floodplain. Based on peaks and depressions in the graph of this data, four major zones or time periods were separated. Identification of key plants revealed changes in the ecosystem over time. These changes indicated that the Muck Swamp, the area of CON-4, may have began as an oxbow lake formed from a meander of the Congaree River during a period when the region was much colder than today.

DETERMINING THE EFFECT OF ESTROGEN ON THE AVERAGE WEIGHT GAIN  
OF *MUS MUSCULUS*

Jessica Casey Certain

Walhalla High School

This project is the result of the experimentation on the effects of estrogen on the average weight gain of *Mus musculus*. The project was begun to prove that if *Mus musculus* were given estrogen then they would gain more weight than that of the *Mus musculus*, or mice, without added estrogen. Two groups of mice were present, mice to be tested with estrogen and mice without estrogen. Estrogen was obtained by using an Ovcon birth control pill. Two ounces of an estrogen-water mix was given to the estrogen mice and two ounces of regular water to the no estrogen mice. Mice's food was regulated to make sure excess food was not the cause of weight gain. The estrogen mice gained an average of 5.4291685 grams a week while the no estrogen mice gained an average of 4.2125

grams a week. The hypothesis “if mice are given estrogen then they will gain more weight than that of normal mice” was proven since the estrogen mice gained an average of 1.216685 more grams than the no estrogen mice.

THE MIGRATION OF ENDOCARDIAL CELLS FROM THE DEVELOPING  
CHICKEN EMBRYO ATRIOVENTRICULAR CANAL (AVC) IS MODULATED BY  
NITRIC OXIDE (NO)

Meghan Chandler

South Carolina Governor’s School for Science and Mathematics  
Mentor: Dr. Robert Price, University of South Carolina School of Medicine

The atrioventricular canal (AVC) forms the mitral and tricuspid valves of the heart. It has been shown that when nitric oxide (NO) is removed from the system, the development of the atrioventricular canal is affected. The heart then forms with several different defects. We exposed AVCs to N<sub>g</sub>-Nitro-L-arginine methyl ester hydrochloride (L-NAME), a nitric oxide inhibitor, in order to see the correlation between the migration of cells from the explants and different concentrations of the inhibitor. The results showed that the cells were inhibited in a dose-dependent manner. Some cells continued to migrate in the presence of high concentrations of L-NAME. We can conclude that certain cells will not require NO for migration. Identification of these cells would require further research.

ASYMBIOTIC ORCHID GERMINATION IN THREE ENVIRONMENTS REMOTELY  
MONITORED BY TWO-DIMENSIONAL IMAGE ANALYSIS

Lauren Elizabeth Chandler

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Seeds of five hybrid crosses in the *Laelia* orchid alliance, *Cattleya x Bowringiana* A1BA X *Schomburgkia x Wellesley*, *Cattleya Harrisonial* ‘S.C.’ X *Self*, *Cattleya Stono River* X *Cattleya Blackjack*, *Laelia Anceps Alba* X *Laelia Rubescens* A1BA, *Erdendrum Clorops* X *Epidendrum Young C. Lott*, and *Sophrrolaelia Gratrixiae* X *Schomburgkia Splendida*, were sterilized and introduced to in vitro culture on Knudson C medium with two percent sucrose. Three physical environments were established: a thin film of liquid media stationary, a thin film of liquid media gently rocking, and a thin film distributed on semi-solid agar gel. The five types of seedlings were partitioned on the three treatments with four vessels for treatment factor. Four two-centimeter squares per vessel became the experimental unit and between 10 and 250 seeds per experimental unit were randomly assigned across treatment factors. Every week the experimental units were photographically digitized, and the first week’s data was counted manually. An automated digitizing process was developed with ImageJ software so counting, surface area determinations, and morphological events could be captured in a high through-put system. Correlations of hand counts and automated counts were done. Plant growth and development in the different environments is presented. There was no statistically significant difference in the plant growth and development rates for the different environments.

## NOISE REDUCTION IN THE WHS WEIGHT ROOM

Hugh A Clark III  
Walhalla High School

This case study in acoustics considers excessive reverberation in the weightlifting room at Walhalla High School and explores potential solutions.

The construction of the room consists entirely of hard surfaces with low sound coefficients of absorption. The procedure to quantify this condition required precisely measuring all surfaces of differing materials to obtain the area and to multiply each area by its corresponding published noise reduction coefficient (NRC). The summation of these terms provides the factor in sabins for room sound absorption. This variable directly affects reverberation, and by changing the NRC of surfaces in the room, reverberation time (RT) can be extended or shortened. In this project, the change to RT by the addition of panels with high NRC ratings was calculated, resulting in a specific design which optimizes performance and cost.

Using Sabin's formula  $RT60 = k(V/Sa)$ , it was determined that the present RT is 3.32 seconds, considerably higher than the design target of 1.0 to 1.2 seconds. The constant  $k$  is 0.049, and the Volume of the room was determined to be 16,800 ft<sup>3</sup>.  $Sa$  was calculated at 248 sabins at present, and 778 for the optimal design.

The replacement of ceiling surface area with high NRC panels would maximize the effect. In addition, the ceiling provides the optimal location in terms of aesthetics and causes the least interference with usage of the room. In conclusion, the addition of 480 ft<sup>2</sup> panels with NRC rating of 1.15 will reduce RT to a very acceptable 1.06 seconds.

## STATISTICAL STUDY OF THE DISTRIBUTION OF THE LENGTH AND THE SIMILARITY SCORES OF INTERFACIAL SEGMENTS IN A LARGE SET OF PROTEIN-PROTEIN COMPLEXES

Kacey Coley  
South Carolina Governor's School for Science and Mathematics  
Mentor: Dr. Emil Alexov, Clemson University

A large set of protein-protein complexes from the previously developed database ([www.ces.clemson.edu/compbio/protcom](http://www.ces.clemson.edu/compbio/protcom)) were subjected to computational methodology to find amino acids that are located at the interface of the complexes. The list of these amino acids was further analyzed to build continuous segments. The length of these interfacial segments was analyzed statistically to find the distribution of the length. The results for this project indicate that there is no significant size common to all sequence lengths. This project is part of a large project in the lab that is aimed to predict protein-protein interactions.

## LASER EFFECTS ON VIABILITY AND FUNCTIONALITY OF CELLS AFTER 10 SECOND EXPOSURE

Ryan D. Cooke  
South Carolina Governor's School for Science and Mathematics  
Mentor: Dr. Bruce Gao, Clemson University

This research project's goal is to find if the process of laser cell patterning has a negative effect on cells. The technique of laser cell patterning is a recently developed technique that makes it possible to easily and precisely move individual cells. This technique uses a laser to radially draw a cell into the laser beam and axially pushes the cell onto a target surface. This research project uses neuron cells that are taken from the brain of seven day chicken embryos to test the effect of the laser. After the cells are removed

from the forebrain of the chicken embryo, the cells are placed in a certain density on a grid so that they can be easily located. Media is added to the grid in order to keep the cells alive. This is done for at least three dishes per test. Then eight cells are hit with the laser in each individual dish. The position of the cells is recorded and then the cells that were hit by the laser are observed at increments of 4, 12, 24 and 36 hours in reference to control cells that were not shot by the laser to see if the laser had any effect on the cells.

ADSORPTION OF PROTEIN IN PRESENCE OF SURFACE ACTIVE COPOLYMER  
GLYCIDYL METHACRYLATE AND OLIGO (ETHYLENE GLYCOL)  
METHACRYLATE (COOEGMA)

Katherine L. Dextraze

South Carolina Governor's School for Science and Mathematics

Mentor: Dr. Igor Luzinov, Clemson University

The adsorption of protein onto a hydrophobic Polystyrene surface was studied in the presence of a surface active copolymer, glycidyl methacrylate and oligo (ethylene glycol) methacrylate (coOEGMA). It was hypothesized that the ethylene glycol chains present in coOEGMA would prevent the adsorption of the protein to the Polystyrene surface and that the glycidyl methacrylate, which contains epoxy groups, would envelop the protein molecule. It was determined that coOEGMA prevented the adsorption of protein to the Polystyrene surface and the coOEGMA was not chemically bound to the surface. However, the coOEGMA showed little affinity for binding to the protein molecule.

THE EFFECTS OF DEPOSITION ANGLE AND RATE ON NANOSTRUCTURING  
OF EVAPORATED SILVER FILMS

Kate Drafts

South Carolina Governor's School for Science and Mathematics

Mentor: Dr. Thomas Crawford, University of South Carolina

Silver thin films were investigated to determine the critical process parameters for obtaining the nanostructured film morphology necessary to observe plasmon-resonance-enhanced optical scattering. Films were deposited on silicon both at normal incidence and at the extreme oblique angle of 87 degrees and at two different rates for each angle, 0.5 angstroms per second and 10 angstroms per second. Dark field microscopy was employed to analyze the optical properties of the films. For polarized input white light, the scattered light intensity was anisotropic for the obliquely deposited film. The data showed that oblique angles are necessary to alter the intensity. Additionally, the average intensities for each film showed that a slow deposition rate produces a higher intensity than a faster rate. Atomic force microscopy confirmed the morphological origin of these differences in scattered intensity and suggested that a slower rate is needed in order to greatly alter the films. Thus, in order to grow significantly different films that exhibit high intensity and polarization differences, it is important to grow films at oblique angles and at very slow rates.

EXPRESSION OF SERINE PROTEASE TRYPSIN DURING EMBRYONIC  
DEVELOPMENT

Jeness Ellen Drawdy

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Mentor: Dr. Victoria Turgeon, Furman University

Trypsin is a serine protease that commonly occurs in the stomach and the bloodstream but has also been found in the spinal cord of developing embryos. Studies have shown that trypsin is involved in the development of motor neurons in the spinal cord as they make connections to muscle cells. Trypsin breaks down the extracellular matrix to aid axon growth and is an activator of PAR-2, which triggers apoptosis. The study conducted in the summer of 2004 by Paige Porter showed localization of trypsin in the spinal cord of developing chick embryos. The antibody used in this study produced weak signaling so the present study was conducted to confirm or expand on the results from Porter's study. A newer antibody was used to produce a stronger signaling of trypsin expression. Chick embryos from embryonic days 3-10 were sacrificed, embedded in paraffin and cross-sectioned, mounted onto slides, and then immunohistochemically treated with antibody and stained. The viewing of the slides showed that no localization of trypsin expression was found. Trypsin was seen to be expressed in the same concentration throughout the spinal cord with no variation according to embryonic day. Several explanations can be given for these results. Trypsin could be ubiquitously expressed throughout the spinal cord, the antibody was in fact less specific due to specie variation, or there could have been an error in the staining procedure. The data does show that trypsin is expressed in the spinal cord of developing embryos.

AMBUSH SITE SELECTION AND ONTOGENETIC SHIFTS IN FORAGING  
STRATEGY IN A SEMI-AQUATIC PIT VIPER, THE EASTERN COTTONMOUTH  
(*AGKISTRODON PISCIVORUS PISCIVORUS*)

Evan A. Eskew

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Mentor: Judith L. Green, Savannah River Ecology Lab

Although habitat selection has been studied in a variety of snake taxa, little is known about habitat selection in aquatic snake species. Additionally, due to their small size and secretive nature, juvenile snakes are seldom included in habitat selection studies. The Eastern Cottonmouth, *Agkistrodon piscivorus piscivorus*, is a semi-aquatic pit viper that is known to use sit-and-wait foraging strategies. Ambush hunters such as the cottonmouth are likely to actively select habitats that increase opportunity for successful prey capture while minimizing predation risk and maintaining optimal thermal and hydric conditions. The goal of this project was to characterize the foraging strategy and microhabitat use of cottonmouths at Ellenton Bay, an isolated Carolina Bay freshwater wetland on the Savannah River Site, Aiken Co., SC. We collected data on 55 habitats of 52 individual cottonmouths located by nighttime visual surveys, as well as 225 randomly-selected habitats within our search area. The cottonmouths at Ellenton Bay exhibited an ontogenetic shift in foraging strategy with juveniles using sit-and-wait foraging methods predominately around the edge of the bay while most adults foraged actively in deeper water. Additionally, juveniles selected habitats with more land, more open mud, and less viscous mud than randomly-selected locations. Our results indicate that ontogenetic differences in morphology, physiology, diet, and predation risk can influence foraging strategy and microhabitat selection in snakes.

THE INGESTION AND TRANSLOCATION OF THE NEMATOCYSTS OF *HYDRA LITTORALIS* IN *MICROSTOMUM* SP.

Jack Nixon Etheredge

South Carolina Governor's School for Science and Mathematics.

Mentor: Dr. Julian P Smith III, Winthrop University.

*Microstomum* are freshwater invertebrates that consume *Hydra* and retain *Hydra* nematocysts (protein structures used primarily for defense and prey capture). "Cnidophage" describes a specialized cell in *Microstomum* that contains a nematocyst in a large vacuole. Cnidophages have condensed DNA and seemingly decreased protein production. Since cnidophages were only observed in *Microstomum* that contain nematocysts, it is probable that cells are differentiating into cnidophages. *Microstomum* sp. were fixed in epoxy resin for electron microscopy at various stages after the ingestion of *Hydra* tentacles from live *Hydra littoralis*. A Chi Square test relating the distribution of stenoteles versus other nematocysts in both living *Hydra* and *Microstomum* showed that stenoteles were being preferentially retained by the *Microstomum*. Phagocytosis of nematocysts by gastrodermal cells and the movement of the phagocytes through the basal lamina and parenchyma is the hypothesis backed most by the data collected. This hypothesis is favored over phagocytosis by a gastrodermal cell, ejection of the nematocyst into the parenchyma, and phagocytosis by parenchymal cell because electron micrographs showed gastrodermal phagocytes crossing the basal lamina of the gut. Alexa 488/ phalloidin stain was used to prepare intact *Microstomum* samples that already contained properly oriented nematocysts under the epidermis for fluorescence and confocal microscopy. This showed a high concentration of actin filaments surrounding the bottom of each cnidophage, suggesting that a structure that had looked like a membrane using light microscopy was actually an associated muscle cell, as it appeared to be in electron micrographs.

THE EFFECT OF CERTAIN PRODUCE ON THE AMOUNT EATEN BY A CARIBBEAN LAND HERMIT CRAB (*COENOBITA CLYPEATUS*)

Laura S. Falendysz

Walhalla High School

Toxic chemicals are starting to be added to processed hermit crab foods as preservatives. This experiment was conducted to discover which produce, between: carrots, cauliflower, red grapes, and granny smith apples, is most preferred among Caribbean land hermit crabs.

Caribbean land hermit crabs were placed in a fish tank with sand. Water, in a dish, was placed in the tank. Small amounts of granny smith apples, red grapes, cauliflower, and carrots were weighed and added to a lion paw shell. The shell was then placed in the tank. After twenty-four hours, the food was removed and weighed once again. The experiment was repeated for eleven trials.

From the information gathered from the experiment, the hypothesis was supported. Caribbean hermit crabs do prefer red grapes over cauliflower, carrots and apples. Possible reasoning behind this may be the caloric content of each of the foods provided. Grapes, which were, on average, the most preferred had the highest caloric content per unit, and cauliflower, which was the least consumed on average, had the lowest caloric content. Further experimentation can be conducted to find out other preferred foods, which type of grape is most preferred, or what type of benefits do hermit crabs gain from consuming red grapes.

ON THE POSSIBILITY OF PHOSPHORYLATION OF EXTRACELLULAR  
PROTEINS BY PROTEIN KINASES A AND C

Lauren Fender

South Carolina Governor's School for Science and Mathematics

Mentor: Dr. Alexey A. Vertegel, Clemson University

Phosphorylation of enzymes is a potentially useful method of regulation of enzymes used in nanotechnology. Phosphorylation is the process in which a phosphate group from one molecule attaches in place of the hydroxyl group of another; in the case of this experiment, the phosphate group is transferred from adenosine triphosphate (ATP) to an enzyme. The long-term goal of the project is to develop a drug delivery system, which is activated at a specific site. The purpose of this particular research is to find whether extracellular enzymes, which normally are not phosphorylated *in vivo* due to the absence of protein kinases in extracellular fluid, will be phosphorylated by protein kinase A (PKA) or protein kinase C (PKC). The enzymes on which the study primarily focuses are lysozyme and trypsinogen. A luciferase assay is used to tell indirectly whether or not phosphorylation occurs by showing the consumption of ATP. Lysozyme appears to be phosphorylated by PKA based on consumption of ATP in the reaction, but further testing is needed to verify this result. If it is phosphorylated, the next step is to find what change is made to the activity of the enzyme upon phosphorylation to determine whether it could be used.

ENDOTHELIN-1 INDUCED ACTIVATION IN THE SOMATOSENSORY CORTEX  
AT TWO AGES

Carolyn Fisher

South Carolina Governors School for Science and Mathematics

Mentor: Dr. Sarah M. Sweitzer, University of South Carolina School of Medicine

Though there is extensive research regarding pain sensation in adults, there is very little known about such in infants and small children. Sickle-cell disease is red blood cell disorder that spans all age groups and is characterized by painful vaso-occlusive episodes. Endothelin-1 (ET-1) is released during these episodes. When ET-1 is given to rats, it produces spontaneous nociceptive behaviors. The purpose of my research is to study the differences in ET-1 induced neuronal activity in the somatosensory cortex of rats at two different age groups (child and adult). We postulated that we would find differences in neuronal activity in the same brain regions across the different age groups, specifically that the P60 would have a higher activity than the P21, since these brains were more developed. To perform this experiment, rats from two ages, P21 and P60, males and females, were treated with one of three treatments: ET-1, saline vehicle, or nothing. Next, they were videotaped and scored for behaviors (flinching and paw licking). Brains were collected for c-fos analysis, as a marker of neuronal activity. The number of c-fos positive neurons in the somatosensory cortex was counted. When scoring behavior, we found that P21 rats treated with ET-1 displayed more behavior than ET-1 treated P60 rats. Yet, little difference was seen in the somatosensory cortex of ET-1 treated rats than in either of the other two treatments. These results are not consistent with our initial hypothesis, and further research is needed in this area to draw any conclusions regarding c-fos and pain reception. However, we found that the younger rats appeared to be experiencing greater pain than the older rats, despite their lack of development. The higher behavioral counts following ET-1 treatment suggests that young children with sickle-cell disease may be experiencing robust physical pain during vaso-occlusive crises. This fact could potentially lead to better pain treatment for children.



## HEATING OF INSULATED CONCRETE FORMS THROUGH THE TRANSFER OF UNUSED HEAT FROM PHOTOVOLTAIC PANELS

Adam Fogle

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Mentor: Dr. Roger Dougal, University of South Carolina

Photovoltaic panels tend to produce large amounts of unused heat, which reduces their effectiveness. Transferring the unused heat into Insulated Concrete Forms (ICFs), the heat is used. In some climates the use of ICFs that are not heated will produce a positive return in a few years since they leak less heat than normal wood studded walls. By heating concrete walls, less heat is lost from the house, which results in less money being spent on heating the house. Also, in the summer one could use this system in reverse to cool the ICFs, causing the house to lose more heat and reduce air-conditioning cost. Since both ICFs and photovoltaic panels add to the price of the house, a comparison of costs and savings was done to make sure there would be a reasonable positive return. Cross-linked High-density Polyethylene (PEX) was chosen since it was the most cost efficient piping, having the best cost versus effectiveness ratio. Through the use of the Thermal\_Engine, a java application, and an Excel spreadsheet, the cost effectiveness was found. The results showed that the time before positive return is reached is dependent upon the house and the climate. It also showed that in moderate to cold climates, positive return could be reached in under a decade. In warmer climates, positive return is reached in about twice the time it takes for a moderate climate.

## EFFECTS OF THE TEMPERATURE OF DIFFERENT SOLVENTS ON THE SOLUBILITY OF RUST

Ian Fooks

Walhalla High School

The purpose of the experiment was to determine which of three solvents, used in dissolving rust, most effectively removed rust, and also to see if the temperature of the solvents had an affect.

The first thing that was done was the cutting up of a rusted metal rod into eighteen pieces. Next the eighteen pieces were weighed on a scale one at a time. 25ml of phosphoric acid, hydrochloric acid, and acetone were each prepared to 6M and placed in separate beakers. After five minutes the rods were reweighed. The experiment was repeated two more times. Then with another 25ml phosphoric acid, hydrochloric acid, and acetone were each prepared to 6M and placed in 3 different test tubes. The tubes were heated to 45°C in a water bath in the 500mL beaker. One iron rod was then placed in each of the test tubes. The rods were reweighed. This process was repeated two more times.

The means of the changes in mass of the iron rods are as follows: Hydrochloric acid (20°C) -0.019(g), Phosphoric acid (20°C) -.012(g), Acetone (20°C) -.002(g), Hydrochloric acid (45°C) -0.014(g), Phosphoric acid (45°C) -.017(g), Acetone (45°C) -.002(g).

It was found that hydrochloric acid proved to be the better solvent for rust at 20°C but at 45°C phosphoric acid dissolved the rust better. A possible explanation for what happened might be that phosphoric acid has a lower boiling point than hydrochloric acid so it heats faster. At 45°C it would have more solubility.

## EFFECTS OF SOLUTES ON AMOUNT OF HYDROGEN RELEASED IN ELECTROLYSIS OF WATER

Tomas Fussell  
Walhalla High School

The purpose of this experiment is to determine how solutes effect the amount of hydrogen released. It was hypothesized that salt (an electrolyte) will increase the amount released, and sugar (non-electrolyte) will reduce or show no change in the amount released, while hydrogen peroxide will also increase the amount released compared to no solute. Ten milliliters of solute was dissolved with one-hundred milliliters of water. It was stirred until dissolved. The solution was placed in the electrolysis apparatus. A timer was started, and the electricity turned on. After five minutes, the amount of hydrogen released was recorded. Seven trials were conducted with each type of solute.

Salt - 4ml                      Sugar - 15ml  
Hydrogen - 3ml              Peroxide - 15ml

The data showed that the electrolytes, salt and hydrogen peroxide, increased the Hydrogen released because it increased conductivity. Due to pure water's inability to conduct electricity, little was released. The hypothesis was supported in that the electrolytes dissolved in the water increased the Hydrogen released.

## CELL VIABILITY AFTER LASER EXPOSURE

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Mentor: Dr. Bruce Z. Gao, Clemson University

To control the position of cells in a culture to facilitate the study of interactions and functions, a laser micropatterning technique was developed. This technique uses a weak, focused laser beam. The force from the beam draws particles into the center of the beam and moves them along an axis. Through a computer-controlled manipulation, specific patterns can be created. This project was designed to vary the controllable laser parameters of wavelength and exposure times to determine the factors that cause cell damage. To accomplish this, embryonic day seven chick forebrain neurons were cultured in thirty-five millimeter petri dishes. Control and test cells were chosen an hour after cell placement to insure neuron-coating attachment. The test cells were subjected to the laser. The experimental parameters chosen were a wavelength of eight hundred nanometers and the exposure times of ten and sixty seconds. At four, twelve, twenty-four, and thirty-six hours after laser exposure pictures were taken to study the neuron to neuron interactions. Studying these interactions and learning how to control them will make it possible to reverse spinal cord damage and practically rebuild the spinal cord.

## ASCORBIC ACID CONCENTRATION AS A FUNCTION IN RELATION TO THE METHOD OF PRESERVATION

Christine T. Giap  
Spring Valley High School

It has become an increasing concern in the United States that Americans are not consuming enough fruits and vegetables in their diet. Scientists are now trying to genetically alter certain fruits, such as peaches or strawberries, to hold higher amounts of vitamins, allowing smaller servings of fruit to provide normal or larger amounts of vitamins. The purpose of this experiment was to determine whether preserved fruit juice contained the same amount of ascorbic acid as fruit juice unaltered by chemical

additives or heat fixation. It was hypothesized that pasteurization and chemical preservatives would cause ascorbic acid degradation in orange juice. A batch of oranges was squeezed, using a juicer, and all the juice was pooled together. The juice was then divided into flasks and either nothing, sodium benzoate, or potassium sorbate was added. Several samples of orange juice were pasteurized in canning jars. The samples were then refrigerated for 19 days. On the seventh day, ascorbic acid was measured, and then again on the nineteenth day to determine if there was a decrease in the concentration of ascorbic acid. The ascorbic acid was measured by the application of potassium chromate-diphenylcarbazide with the use of spectrophotometry. An ANOVA test revealed that there were no significant differences in the amount of ascorbic acid between each of the types of preservation method used at  $\alpha=.05$  ( $F=2.99$ ,  $P=0.078$ ). However, trends show the control retaining the most ascorbic acid and pasteurization retaining the least. These results show that potentially harmful chemical preservatives are unnecessary for fruit juices.

#### THE EFFECTS OF NOREPINEPHRINE ON PYRAMIDAL CELLS IN THE PREFRONTAL CORTEX OF RAT BRAINS

Valerie Grant

The Governor's School for Science and Mathematics

Mentor: Dr. Antonietta Lavin, Medical University of South Carolina

The prefrontal cortex (PFC) has been identified as the part of the brain related to attention and memory. The PFC has been implicated in several neuropsychiatric and neurological disorders such as schizophrenia and attention deficit disorder (ADHD). Although there is no cure for ADHD, the disorder is treated with psychostimulants such as methylphenidate (Ritalin). Methylphenidate works by increasing the amount of the neurotransmitters dopamine (DA) and norepinephrine (NE) in the PFC. However, the exact effect that the addition of NE has on the pyramidal cells is currently unknown. The purpose of this project is to identify how NE changes cell activity of pyramidal cells in the prefrontal cortex. A long range goal is to gain a better understanding of how methylphenidate works on the cellular level to treat ADHD. In order to do this, juvenile male rat brains were used and the effects of a known dose of NE (10  $\mu$ M) were assessed by counting the number of spikes (pulses) generated per second. It was found that NE increases the numbers of spikes per second.

#### USING AN INTERNET SOCIAL NETWORKING SYSTEM TO DETERMINE AMERICAN TEENAGERS' PERCEPTION OF ENVIRONMENTAL ISSUES AND NATURAL RESOURCE MANAGEMENT CAREERS

Sarah K. Hager

South Carolina Governor's School for Science and Mathematics

Mentor: Dr. Thomas Straka and Heather Irwin, Clemson University

A simple random survey was constructed and sent to 1000 teenagers throughout the United States to poll their perception of environmental issues and natural resource management careers. The survey began with eight critical environmental issues, and the teenager was asked to rate the issue to show its level of importance in their opinion. Following the environmental issues, there were several open-ended questions that asked where the teenager has gathered most of their information on environmental issues. Then, various questions were used to test their level of interest in natural resource management careers, such as a park ranger or soil and water conservationist. The survey was then concluded with multiple demographic questions to be used in statistical

comparisons. A Microsoft Excel program was used to randomly order all the postal codes in the United States, and the survey was then sent to one teenager in each postal code. The first twenty postal codes were used in each state, therefore amounting to 1000 surveys. The surveys were sent via MySpace, which is a rapidly growing internet social networking system whose target audience is teenagers 13-21 years of age. With a fifteen percent response rate, the data gathered was quite dependable.

DETERMINATION OF THE LOCATION OF MALE MITOCHONDRIAL DNA IN A  
FERTILIZED ZYGOTE FROM *MYTILUS EDULIS* (BLUE MUSSELS) USING  
POLYMERASE CHAIN REACTIONS AND TYRAMIDE SIGNAL AMPLIFICATION

Ursula Shernee' Harrison

South Carolina Governor's School for Science and Mathematics

Mentor: Dr. Richard M. Showman, University of South Carolina

*Mytilus edulis* (blue mussels) are peculiar in that their male to female mitochondrial ratio is five to roughly one hundred thousand. The reason for this is unknown, but the mechanisms of the mitochondrial replication are clearly different. This makes the mussel a perfect model system for the study of human mitochondrial defects. This animal model mimics human mis-regulation. This helps in mitochondrial disease research at the medical level because the *Mytilus edulis* mussels allow us to answer many questions about errors in human mitochondria. The polymerase chain reaction (PCR) is a new technique used in molecular biology for many applications including the diagnosis of genetic diseases, detection of nucleic acid sequences, and analysis of mutations. In this project, we used PCR to generate DNA sequences from double stranded male mtDNA. These are used as probes in tyramide signal amplification (TSA). *Taq* DNA polymerase used during the annealing process extended the primer oligonucleotides to make male mitochondria-specific probes. TSA is a detection method using an enzyme, horseradish peroxidase (HRP), to create a high density labeling of a target organelle *in situ*. Fluorescein is conjugated to the tyramide substrate, and is disposed by the HRP in the male mitochondria. The fluorescein product glows bright green, identifying the male mitochondria. The final step in the project will answer where the male mitochondria move as the egg is fertilized and goes through cleavage.

EFFECTS OF IMPLEMENTING A THERMAL ABSORBING SYSTEM ON  
POLYCRYSTALLINE PHOTOVOLTAIC PANELS

Xavier Cedric Harville

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Mentor: Dr. Roger Dougal, University of South Carolina

The production of solar electric energy is a complicated process that involves collecting photons from the sun through the use of individual silicon cells. Photovoltaic cells use an n-p junction so that when photons hit the junction a current flows, and electricity is produced. However, there are major drawbacks to this process. Economically it is expensive and numerous photovoltaic panels are required for large power loads. Currently cells are only 12- 20 % efficient at converting sunlight into electricity, with most of the absorbed energy from the sun escaping in the form of thermal energy. As solar cells retain more heat, they produce less energy. Experiments were performed to see if water pipes could be implemented beneath panels. This allows the panel to be in direct contact with water. Through simulation using the Virtual Test Bed software, the effects of this structure on the photovoltaic panel were determined. It was found that water pipes reduced the temperature of solar panels

by 3.5° C. This extra heat can be transferred to the house, making solar panels more efficient and economical. Lastly a relationship was found between the system size and the extra power produced. A 3.5 degrees Celsius decrease in a small system (2000 W) results in 97 W of extra power. However, a 3.5 degrees Celsius decrease in a large system (6500 W) provides 174 W of extra power. This is a 79% increase in power, from tripling the size of the system. Therefore it is concluded that decreasing the temperature has better effects in larger systems. Most importantly, this project proved that with continued research on photovoltaic panels, their efficiency can be improved which will make them a more viable energy source for the future.

#### THE EFFECT OF THE AMOUNT OF REM SLEEP AND NON-REM SLEEP EXPERIENCED ON MEMORY FORMATION AND CONSOLIDATION

Sean Hastings  
Spring Valley High School

Since the beginning of the study of sleep, humans have wondered about the purpose of dreams, or more specifically REM sleep. This question has never definitely been answered through science, but many of the explanations for sleep are dismissed. One of the most popular explanations of REM sleep is that it plays a significant role in memory consolidation, which can also be described as everyday learning. The purpose of this research is to evaluate the effect of REM sleep (vivid dreaming) on everyday learning, and seeing if it can be applied to a real learning situation, such as learning a topic over a course of a week. This research will serve to better understand the relationship that has been proposed between REM sleep and memory formation (learning). The hypothesis of the study is that those who experience the most REM sleep over the course of a testing week will show higher scores on the tests. This was tested by having selected groups of students log their amounts of REM sleep, overall sleep and study habits over the course of the week. The students were selected classes and were taught a selected, uniform topic during a week. Those with outlying amounts of average nights slept and hours studied were thrown out to keep a uniform population. During the end of the week, each subject was tested on the topic, which was used to indicate the amount of learning the subjects did over the course of the week.

#### THE ROLE OF CALCIUM-INDEPENDENT PHOSPHOLIPASE A<sub>2</sub>γ IN OXIDANT INDUCED MITOCHONDRIAL DYSFUNCTION.

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Mentor: Dr. Rick Schnellmann, Medical University of South Carolina

Acute Renal Failure and other diseases are mediated in part by reactive oxygen species (ROS). ROS have several targets within the cell, including lipids. Calcium-Independent Phospholipase (A<sub>2</sub>γ) is an enzyme that cleaves the sn-2 bond of the glycerol backbone of membranous phospholipids. This cleaving only occurs when a reactive oxygen species attaches to one of the unsaturated bonds of the fatty acid tail at the sn-2 position. The phospholipid is then separated from the rest of the cell membrane until enzymes can detoxify and reinsert the phospholipid back into the membrane. Thus, in theory, this enzyme is protective against membranous stress when an excess of oxidant strain is present within the cell. In our investigation, we theorized that iPLA<sub>2</sub>γ can be upregulated during stress. We tested this hypothesis by treating cultured renal proximal tubule cells (RPTC) with various stressors to observe if the concentration of iPLA<sub>2</sub>γ is up regulated, down regulated, or stays the same. We hypothesize that the concentration of

iPLA<sub>2</sub>γ will increase to protect the cell from the increase of reactive oxygen species present by the various oxidants. We found that in the presence of ROS, iPLA<sub>2</sub>γ expression does increase within the mitochondria and endoplasmic reticulum. In theory, if the exact application of the enzyme iPLA<sub>2</sub>γ is discovered, a medication could possibly be administered to patients with acute organ failures to cure the disease.

#### THE EFFECT OF AMOUNTS OF CARBON DIOXIDE (CO<sub>2</sub>) ON THE RATE OF MELTING

Matthew C. Hill  
Walhalla High School

Global warming is a major issue in the modern world. Global warming is the process of the Earth's atmosphere rising in heat because of the different levels of carbon dioxide (CO<sub>2</sub>) entering the atmosphere. The purpose of this experiment was to determine the effect of different amounts of CO<sub>2</sub> on the rate of melting. It was hypothesized that if the amount of CO<sub>2</sub> increased, then the rate of melting would increase.

The procedures were as follows. One fourth pound of crushed ice was placed into a plastic box with no CO<sub>2</sub> for thirty minutes. When the time ended the amount of melted ice was measured (with graduated cylinder) and the process was repeated ten times. After the trials with no CO<sub>2</sub> were completed the same procedures were determined with one minute, two minutes, and three minutes of added CO<sub>2</sub> exposure.

The purpose of this experiment was to determine if the amount of CO<sub>2</sub> is increased, would it increase the rate of melting. As more CO<sub>2</sub> was added, the ice melted much quicker. It was concluded that the greater amount of CO<sub>2</sub> caused the ice to melt quicker.

#### DEVELOPING A TRAFFIC SIMULATION MODEL FOR INCIDENT MANAGEMENT

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Mentor: Dr. Ronnie Chowdhury, Clemson University

Major traffic congestion and incident management are two of the most important issues dealt with by DOT's across the country. The purpose of this research project was to simulate certain traffic incident scenarios and test different solutions to them to find which one created the greatest benefit for its cost. The program used to test these scenarios was Paramics. It is a microscopic traffic simulator that almost perfectly mimics the interaction of cars on the highway. Five sections of interstate were simulated from around the state of South Carolina. They were North Charleston, Florence, York County, Greenville, and Columbia. The incidents that were simulated on each stretch of highway varied, but common ones tested were two lanes blocked for one hour, all lanes blocked for 30 minutes, etc.. Strategies tested for incident detection and temporary solutions were safety service patrols, video camera detection, diversion of traffic, and reversible lanes. A set of costs were created to be able to show effectiveness. Some of the items on the list with costs attached were the price of people's time, gasoline use, injuries, and emissions just to list a few. Preliminary simulations showed a very large advantage of diversion, saving \$125,000 in one of the tests.

## PHOSPHORYLATION OF P53 IN CISPLATIN- TREATED HEI-OC1 CELLS

Alexandra Page Hooks

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Cisplatin is one of the best chemotherapy drugs that treat many cancers, but causes hearing loss. The hearing loss is due to the build up of the protein 53 (p53) that would degrade in a healthy cell. In a damaged cell, protein 53 is phosphorylated or builds in the cell causing the cell to die. The aim of my research was to determine which phosphorylation sites cause the activation of p53 in the inner ear. Through western blotting it was determined that the phosphorylation sites of serine 15 and 392 caused the build up of p53. Future experiments include finding a way to prevent these sites from phosphorylating so that cisplatin can be administered without the side effect of hearing loss.

## THE EFFECT OF SHOCK ABSORBERS ON THE DISPLACEMENT OF A MODEL STRUCTURE EXPOSED TO EXTERNAL

Eric Hsieh

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Mentor: Dr. Juan Caicedo, University of South Carolina

When a building is exposed to external forces such as an earthquake, it oscillates back and forth. This vibration can be dangerous and lead to terrible accidents if its effects are neglected. Structural control devices are mechanisms that reduce the vibrations of a structure. One such way to do this is to attach a damper to absorb the energy from the vibrations and thus reduce the vibration. The purpose of this project is to assess the effect of this solution in a model scaled building. For this study, a five floor buildings will be designed and constructed. The floors of the building in this structure will be modeled with metal plates and the columns with metal rods. The building will be pushed and allowed for free vibration. A damper system using shock absorbers from remote control cars will be attached to the bottommost floor, and its effect on the vibration of the building will be measured with an accelerometer. This test will show the effectiveness of the dampers on the structure. Different numbers of dampers can also be added to the system to observe the changes.

## EFFECT OF THE EXTRACELLULAR MATRIX ON CARDIAC FIBROBLAST RESPONSE TO ANGIOTENSIN II

Rui Jiang

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Mentor: Dr. Wayne Carver, University of South Carolina School of Medicine

During hypertrophy, or the enlargement of cardiac muscles in this case, the extracellular matrix (ECM) in the heart undergoes dramatic remodeling that includes an increase in protein content and an alteration in mechanical structure. These changes lead to the formation of cardiac fibrosis, which contributes to diastolic dysfunction and heart failure. The presence of angiotensin II, a hormone that regulates blood pressure and myocardial hypertrophy, enhances the accumulation of ECM proteins, such as fibronectin, collagen, and laminin. In addition, the pressure overload creates mechanical stress that also leads to excess production of the ECM. However, the role of the ECM is unclear in the regulation of cell behavior and cell response to biochemical factors like angiotensin II. Thus, fibroblasts were cultured on simulated ECMs to measure the cell response to angiotensin II. Through the analysis of cell spreading, proliferation and matrix metalloprotease II

(MMP-2) activity, it was concluded that although an ECM substrate is needed for cell spreading, the substrate did not significantly affect the fibroblast response to angiotensin II individually. MMP-2 activity level showed that fibroblasts responded only in the presence of both mechanical stretch and angiotensin II. These results indicate that a possible combined effect of substrates and biochemical factors could evoke cell response. Future researches can investigate the combined effect of various ECM substrates in different concentrations on fibroblast response.

#### WHERE DO MICE EMBRYOS THRIVE BEST?

Yvonne Kao

South Carolina Governor's School for the Arts & Humanities

As the field of Assisted Reproductive Technology (ART) expands, so does the need to understand how differing laboratory environments affect development of embryos cultured in vitro. In theory, a sterile environment should provide the best possible chance for embryos to reach their full developmental potential. However, few prospective randomized trials addressing this issue exist in the scientific literature. Purpose/Objective: How does the influence of two different laboratory environments affect embryo development? Hypothesis: The ART Cleanroom lab will not be as effective in culturing the mice embryos as the ART Andrology lab. Methods: Embryos for this experiment were obtained from six, hyperstimulated mice. These mice produced approximately 280 embryos. The experiment was divided into four parts, performed on four separate days. Half of the embryos were allotted to an incubator in the Cleanroom lab and the other half to an incubator in the Andrology lab. These two-cell embryos were cultured in 50  $\mu$ L drops of human tubal fluid (Irvine Scientific, Santa Ana, CA) covered with mineral oil in petri dishes. Embryos were cultured in groups of ten/drop. After three days of culture, embryos were checked for blastocyst development. The blastocyst developmental rate was determined by the number of blastocysts divided by the number of embryos allotted to each lab. Statistical tests were performed using Chi square tests. Results: Blastocyst developmental rates for the four days follow: Day 1: Andrology Lab 37/39 = 95%, Cleanroom Lab 39/39 = 100%; Day 2: Andrology Lab 18/20 = 90%, Cleanroom Lab 20/20 = 100%; Day 3: Andrology Lab 24/30 = 80%, Cleanroom Lab 30/30 = 100%; Day 4: Andrology Lab 48/48 = 100%, Cleanroom Lab 47/48 = 98%. The Chi square test returned a P-value greater than 0.05. Discussion: Neither lab was significantly more effective than the other in culturing the mice embryos to the blastocyst stage. There were a number of factors that might have contributed to the outcome of the experiment. One example deals with the air content of each room may have affected the development of the embryos. However, further studies must be done to be certain of such a factor. Conclusion: The hypothesis was accepted. Neither of the ART labs proved more effective in culturing the mice embryos than the other lab. Further studies might include: different types of laboratories in other buildings, the use of different animal embryos, different materials and times in the incubator.

#### THE EFFECT OF THE AMOUNT OF OIL IN AN OIL MIXTURE ON THE SMOOTHNESS OF AN ENGINE

Taylor G. Kelley

Walhalla High School

This experiment was conducted to see if there is a way to save gas by using more oil. By doing this experiment I was hoping that it would show me a way to save gas without the performance of the weed eater being hurt. It was hypothesized that the extra oil will allow the weed eater to run off of less gas while still performing well.



This experiment was conducted by changing the amount of oil in a gas-oil mixture and then testing the weed eater and rating it on a 1-5 scale. The major findings of the experiment were that you can't add extra oil and not affect the performance of the engine. The hypothesis was not supported by the data. The data were completely opposite from my original hypothesis. A possible explanation for the results is that I may have not changed the amount of oil enough. If you were to do this experiment I recommend that you do it when it is warm outside and I would also try using less oil to see if it works better.

## THE EFFECT OF STORM WATER RUNOFF ON THE WATER QUALITY OF CARY LAKE

Raymond Keyes  
Spring Valley High School

This information would benefit DHEC, people using the lake, and make people aware of the dangers, if any to drastic, of swimming in lakes right after it rains heavily. It was hypothesized that storm-water runoff has only a negative effect on the water quality of Car Lake: lower pH (acidic), increased turbidity (unclear), high nitrate levels, constant phosphate levels, low dissolved oxygen/ BOD levels. Water samples were collected from Lake Cary (Arcadia Lakes, S.C.) before and after significant rainfalls over a period of two months. The following water quality tests were performed on the water samples: pH, phosphate, turbidity, nitrate, dissolved oxygen, and biochemical oxygen demand. The pH did not become more acidic; on average it was more basic. The phosphate levels recorded remained above 0.03 parts per million (ppm). Dissolved oxygen levels dropped to the point of almost not supporting fish after a rainfall only at a location where storm water runoff flowed directly into the lake. The other locations did not drop as significantly. Nitrogen level testing showed that the nitrate level remained constant at all locations before and after the storm. Out of all the tests, turbidity showed the most dramatic increase after a storm. The JTU level, clarity, tripled or quadrupled in most cases after the storm.

## DEFINING *CIS* SEQUENCES THAT REGULATE ALTERNATIVE SPLICING OF EXON 4 WITHIN THE PRIMARY TRANSCRIPT OF PRX1

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*Cis* sequences within the primary transcript of Prx1 gene, particularly *cis* sequences in the introns on either side of exon 4, are critical for regulating the alternative splicing of exon 4, which in turn determines the type of protein that is expressed from this genetic locus. During this study, C2C12 mouse mesenchyme cell line and chick limb mesenchyme cells were used as models systems for the two different ways that exon 4 could be spliced. Chick Limb Mesenchyme cells predominantly exclude Prx1 exon 4 encoding a protein that is a transcription activator. C2C12 mouse mesenchyme cell line predominantly include Prx1 exon 4 encoding a protein that is a transcriptional repressor. A minigene was previously generated that recapitulates the Prx1 splicing in chick limb cells and C2C12 cells. This minigene, and especially deletion constructs of it, were used to define the sequences that are critical for regulating inclusion or exclusion of Exon 4. Our research indicated that indeed *cis* sequences in the introns on the right side of exon 4, are critical for regulating the alternative splicing of exon 4. The significance of our research is to understand the development of cartilage, bones, and vessels. While only tested in mice,

it provides a stepping stone for humans. In this study, it was found that even though Prx1a and Prx1b are alternatively spliced from the same homeobox gene they differ greatly. Due to the success of our research the minigene was narrowed down to a more specific point of focus; from 5585 *cis* sequences to a mere 300 *cis* sequences.

#### DRUG DISCRIMINATION BETWEEN THE EFFECTS OF PSILOCYBIN AND LSD

Corey Dwayne King

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Mentor: Dr. Sandra Kelly, University of South Carolina

The purpose of this research project was to determine the difference between two psychedelic drugs, psilocybin and lysergic acid diethylamide (LSD). While serotonin is solely responsible for the effects of psilocybin, LSD is characterized by a second phase, this one resulting from the presence of dopamine. Initially, four water-deprived rats underwent an extensive and complicated procedure known as "shaping," in which they were taught to press levers located inside of operant boxes in order to receive a water reward. After they became familiar with the procedure, injections could begin. The rats were then injected with one of two solutions per session, either saline or psilocybin. They were then expected to perform as taught, and press the lever that corresponded to the effects they were feeling. This data were recorded by a computer program called MedPC, and were separated into various categories on a Microsoft Excel spreadsheet. Eventually, psilocybin will be replaced in this procedure by LSD, and various antagonists will be injected as well in order to determine what specific parts of the brain are being affected. Discovering which neurotransmitters are responsible for the effects at various time will help researchers to gain a deeper understanding overall impact of these drugs on the conscious mind.

#### THE EFFECT OF HEIGHT, GENDER AND SHOT TYPE ON SHOT ACCURACY IN BASKETBALL

Hilary Lattimore

Spring Valley High School

Basketball game winners are determined by which team scores the most points. These points are scored by shooting. The purpose of this study is to see if height, gender and shot type have an effect on shot accuracy. It is predicted that taller females and shorter males will have the highest percentage, in the aspect of height. Males will, overall, have better accuracy than females and there will be a higher amount of free throws made compared to jump shots. Subjects were gathered and each shot thirty free throws and thirty jump shots. The number of accurate shots, and height and gender of participants were recorded. No correlation was found between height and shot accuracy ( $r=0.349$  in females,  $r=0.381$  in males,  $r=0.273$  in all individuals). Males had a higher shooting accuracy than females ( $p=0.004$ ). Also, among females there was no a significant difference between the number of free throws and jump shots made ( $p=0.345$ ), but in males, there was a better shooting accuracy with the free throws ( $p=0.010$ ). Also, overall there was a better shooting accuracy with free throws ( $p=0.014$ ).

EVALUATING THE WATER-COLLECTING PROPERTIES OF VARIOUS  
MATERIALS IN A LOW-COST DEW CONDENSER FOR PLANT GROWTH IN A  
SIMULATED ARID CLIMATE

Aurel Lazar  
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Desertification has for a long time been plaguing our world. In recent years, exponential population increases have only aggravated the situation, calling for new techniques and strategies to be used to stop the spread of arid desert areas. One such strategy involves a wire farm in which water condensation forms on nocturnally cooled wires in hot desert air. The condensation is then allowed to drip successively from wire to wire until it reaches an underlying plant row. Various condensing substrates were analyzed for their water collecting abilities. It was hypothesized that water yield would increase with a general increase in both density and specific heat of the substrate. Because it was also hypothesized that size would have an influential role in water collection, a second experiment tested varying sizes of the wire that produced the most water. A third experiment tested a hypothetical nocturnal water condenser for feasibility. All the data collection was done in an environmental chamber set to averaged desert conditions, and the results for each section were analyzed using an ANOVA test. While this may be a possible method of extracting water where it is not normally found, future studies will have to expand and fully explore the world of wire farms.

THE EFFECT OF OCEAN ACIDIFICATION ON THE SHELL SIZES OF  
*AMMONIA BECCARII*

Valentin Lazar  
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There has been an increase of carbon dioxide entering the atmosphere since the Industrial Revolution, and the oceans are absorbing about half of the carbon dioxide. This is causing ocean acidification due to the increase of hydrogen ions in the ocean, and is causing the calcium carbonate shells to dissolve. Some of the organisms at risk include plankton, foraminifers, and coral, which are crucial in marine ecosystems. The purpose of this experiment was to determine whether ocean acidification has a significant effect on the shell sizes of marine calcifiers. *Ammonia beccarii*, an estuarine foraminifer, was used during the experiment as the organism of choice. It was hypothesized that as the pH of the seawater decreased, the shell sizes of the *Ammonia beccarii* would decrease. *A. beccarii* was tested in two containers with a pH of 8.3 and a pH of 7.9. The *A. beccarii* were kept in the treatments for 15 days while keeping salinity constant, and replacing the water regularly. The shell sizes were measured before and after the experimentation using Motic Images, a microscope-imaging program. A two-sample t-test was conducted prior to experimentation to make sure the two groups were from the same population, and then afterwards to see if the two groups came from the same population. The two-sample t-test showed that  $t_{0.05(2), 43} = 1.96$  with the t-value = 3.29, meaning that the two groups were not from the same population. Therefore, ocean acidification does have an effect on the shell sizes of *Ammonia beccarii*.

EXPRESSING SIRNA FROM A POLYMERASE II PROMOTER BY GENERATING A  
PSK-HTERT-DR-SHRNA PLASMID FOR CFLIP

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siRNA's ability to silence the expression of genes encouraged scientists to study its potential applications in cancer research. The cancer specificity of the hTERT (human Telomerase) promoter, and siRNA's ability to downregulate an apoptosis inhibitory gene called cFLIPs has encouraged the construction of siRNA for cFLIPs with an hTERT promoter that has been modified with a proprietary sequence (labeled DR). The DR sequence allows for the polymerase II promoter to produce short and precise RNA molecules like the polymerase III promoter. This research allowed for the generation of a plasmid psk-hTERT-DR-shRNA, which was subsequently tested for functionality in cancer cells.

EFFECT OF VITAMIN A DEFICIENCY ON ASCORBIC ACID SYNTHESIS IN  
CHICKS

Heidi Lindler

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Mentor: Dr. Denzil Maurice, Clemson University

Vitamins are essential nutrients and are not synthesized by animals and hence must be obtained from the diet. However, there are some exceptions; for example, certain mammals and poultry have the ability to synthesize vitamin C or ascorbic acid (AsA). The objective of this study was to determine whether vitamin A deficiency has an effect on tissue AsA and the activity of L-gulonolactone oxidase (GLO) in commercial meat-type chickens. The control and deficient diets were fed from day-old and terminated at 3 weeks when responses were measured. Growth was retarded by vitamin A deficiency and livability was 100%. Vitamin A deficiency impaired activity of GLO but did not alter the concentration of AsA in the plasma, liver, or kidney. These results are consistent with those observed in rats; that a low vitamin A diet will affect the biosynthesis of AsA.

NANOSCALE STABILITY: THE CHARACTERIZATION AND MODIFICATION OF  
NANOSTRUCTURES ON AG(111) USING SCANNING TUNNELING MICROSCOPY

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Mentor: Dr. Chad E. Sosolik, Clemson University

Nanoscale intrinsic surface features on an Ag (111) surface have been characterized and modified using a scanning tunneling microscope (STM). The need to develop an understanding of the stability of nanometer-sized objects at room temperature is paramount if real-world nanoelectronic technology is to become a reality. To this end, the time evolution of Ag (111) adatom and vacancy islands that were created through either ion sputtering or STM tip-related effects was recorded. The diffusion and decay of these nanostructures were followed over time periods up to five hours. Results indicate general agreement with previous data on the role of both sputtering and STM current/voltage effects. Of particular interest was the observation that well-defined and stable vacancy islands can be created through controlled tip crashes into the crystal surface.

THE EFFECT OF THE HERB GOLDENSEAL (*HYDRASTIS CANADENSIS*) ON  
THE EXPRESSION OF THE INFLAMMATORY GENE COX-2

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Mentor: Dr. Chin-Fu Chen, Clemson University

Goldenseal (*Hydrastis canadensis*) is a "cure-all" herb which grows along the east coast of the United States and Canada. Native Americans used it as an outer skin wash for sores, a medicine for intestinal difficulties, a remedy for snake bites, and a dye for clothing and face paint. Presently, Goldenseal is thought to aid the immune system and help fight illnesses such as the flu or cold. Too high a concentration or too high a dosage of Goldenseal could be toxic to a person. Different concentrations of Goldenseal root and leaf extracts were tested with human white blood cell lines THP-1 and U937 using a Cell Titer-Blue Assay. A "safe" concentration was found that would not kill the white blood cells. The RNA of both cell lines were incubated with the Goldenseal reagents, LPS (lipopolysaccharide) to represent a bacterial infection, and both Goldenseal reagents and LPS. This was to determine if the Goldenseal could inhibit the COX-2 (Cyclooxygenase-2) gene; under a bacterial infection, COX-2 is an inducible enzyme expressed in activated macrophages and other cells at the site of inflammation, the immune system's first response to infection or irritation. Using real time PCR, the RNA of the two blood cell lines was then tested with the "safe" concentration of Goldenseal root and leaf for the expression of the gene COX-2. The PCR results showed that, instead of reducing the gene, Goldenseal promoted inflammatory COX-2 expression in human monocytic cells.

SWIMMING AND MOVEMENT RHYTHMS IN THE BLUE CRAB (*CALLINECTES  
SAPIDUS*) TO PREDICT DISTRIBUTION AND ABUNDANCE IN A  
STRONGLY TIDAL ESTUARY

Sarah C. McCall

South Carolina Governor's School for Science and Mathematics

Mentor: Dr. Dan Rittschof, Duke University Marine Laboratory

The blue crab, *Callinectes sapidus*, is a common marine invertebrate found on the western Atlantic, Gulf, and Caribbean coasts from New England to South America; it is primarily an estuarine species (Dickinson et al. 2006). There have been declines in the total catch of blue crabs recently, and because of its importance as an economic crop there have been studies to help understand the behaviors of the organisms in hopes that they may lead to conservation programs. In this study, juvenile, premolt, and newly mated female blue crabs were evaluated. Their vertical and horizontal swimming and walking rhythms were studied. Crabs were put in cylindrical tubes, subjected to no light, tidal or foraging cues and monitored with a time-lapse video recorder for four to five days to study vertical migration. To observe the walking behavior crabs were monitored in a 19L bucket for three to four days in conditions where the crabs received no light, tidal, or foraging cues. Results found that juveniles had a dominant circalunadian rhythm in vertical migration and had a circatidal walking rhythm. Premolt females had no conclusive results for vertical migration, but had both a circalunadian and circatidal horizontal rhythm. Newly mated females had a dominant circalunadian rhythm in vertical migration and a minority of crabs displayed a circatidal rhythm. No data was collected for the horizontal movement assay. When the overall activity of all the blue crab life stages examined is compared, we find that the interests of each life stage are tailored to the specific needs of each type of crab; although further studies must be conducted on the life stages evaluated in this study.

THE USE OF ARTIFICIAL VISUAL CUES IN THE ASSESSMENT OF FORAGING STRATEGY BY *MANDUCA SEXTA*

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Mentor: Dr. Robert Raguso, University of South Carolina

*Manduca sexta*, commonly known as hawk moths, often feed from large white flowers. After landing on a flower, it will extend its proboscis and feed from the flower's nectar site. It has been proven that they use tactile cues to locate and feed from the nectar sites of these flowers. However, the question still remains as to whether visual cues are used as well. Using three different arrays of artificial flowers, the foraging and feeding behaviors of male hawk moths were observed and recorded. One array consisted of white disks with no lines (used as a control), another had parallel lines that went past the nectar site, and the third had white disks with perpendicular lines with the nectar site in the center. During the course of the experiment, two major questions were asked: how long does it take for the moth to find the flowers and how long does it feed from that particular flower. If they do use these visual cues, then after feeding from one flower they will be able to go to another flower identical to the first and feed from there as well. If the time that the moths uses to feed from the floral array with the perpendicular lines is less than the other two arrays, then this would indeed prove that they are using the visual cues to their advantage.

ANTIMICROBIAL SUSCEPTIBILITY OF *ENTEROBACTERIACEAE* ISOLATED FROM ENVIRONMENTAL SOURCES

Sean P. McCormick

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Bacteria that have developed resistance to antibiotics can be a major problem for public health. These bacteria can be found almost everywhere and the resistance can be transferred between bacteria, creating the potential for multiple antibiotic resistant pathogens that could not be destroyed by current antibiotics. The purpose of this experiment is to determine if bacteria that can be found in the environment and the extent of the resistance to antibiotics. It was hypothesized that the newer, broad spectrum antibiotics will be more effective than older antibiotics. Also, Vancomycin will not be effective because it inhibits cell wall synthesis and is not effective against gram negative bacteria. Bacteria were isolated from local pond water using .45 micron filter paper to trap the bacteria. These bacteria were then transferred to broth, which was poured onto plates to create confluent bacterial growth. Antibiotic disks were placed on top of the bacteria, and the plates were incubated overnight. The zones of inhibition created by the antibiotics were measured and the average was compared to a published standard value for each specific antibiotic. The statistical analysis of the results via a t-test found that the bacteria were susceptible to both Tetracycline,  $p=.999$ , and Streptomycin,  $p=.999$ . The bacteria were only moderately susceptible to Ampicillin,  $p=.999$ , and resistant to Vancomycin,  $p=0$ .

VIBRATION MODELING OF THE AH-64 APACHE HELICOPTER DRIVE TRAIN

Tristan McKinney, South Carolina Governor's School for Science and Mathematics

Mentor: Dr. Abdel Bayoumi, University of South Carolina

In multimillion dollar military aircraft such as the Army's AH-64 Apache helicopter, proper maintenance is essential for extending useable operational life and preventing catastrophic in-flight failures. The ability to diagnose emerging faults in the drive train

and structure and to develop accurate timetables for part replacement can prevent crew injury or death and save money. Because the vibrations traveling through the tail sections of the helicopters provide vital clues as to the condition of the parts inside, vibration analysis is an essential component of the diagnosis process. Before an effective system for analyzing these vibration patterns can be developed. It is necessary to create a sufficiently realistic model of the tail section (empennage and tail boom). Several different possibilities for models exist, ranging from a simple rigid structure, such as a concrete block, to actual tail sections from the helicopters themselves. The construction of a miniature test stand, consisting of a dynamometer with associated shafts, mount, joints, and bearings, was carried out to examine the feasibility and effectiveness of the different models. The information gained from this prototype will help designers foresee difficulties in the construction and operation of a full-sized system. This miniature test stand was designed in such a way as to allow several configurations to be tested, including a rigidly-mounted structure and a structure that approximates the tail section of the AH-64 Apache.

THE EFFECT OF DIET COKE, DARK GRAPE JUICE, CHOCOLATE MILK,  
COFFEE, AND TEA ON THE STAINING OF VARIOUS DIRECT RESIN-BASED  
FILLINGS

Erin E. McPherson  
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The purpose of this experiment was to determine how diet coke, grape juice, chocolate milk, tea, and coffee affected the discoloration of a nanohybrid, nanofill, flowable, microfill, and hybrid dental composites over a period of three weeks. The five types of composites used were Tetric EvoCeram, Filtek Supreme Plus, LuxaFlow, Filtek Z 250, and Aelite LS Posterior composite. It was hypothesized that the more acidic and dark a beverage was, the greater the amount of staining would occur for all five composites. The pH level of each beverage was measured before and after submersion of the composites using a pH meter. The shade of each composite was also measured before and after submersion using a shade guide. Thirty extracted teeth were used each trial to place the composite, and five extracted teeth, each with a different composite type, were submerged in the six beverages. After analysis using a one-way ANOVA ( $p < 0.001$ ), two-way ANOVA ( $p < 0.001$ ), and two post-hoc Tukey Tests, it was concluded that coffee caused the most staining for all of the composites and that there was no correlation between pH level and the changes in shade of each composite. Past studies concluded that coffee caused the most staining compared to other beverages but also concluded that pH level does affect staining.

LINKAGE GROUP INVOLVED IN *HELIOTHIS VIRESCENS* RESISTANCE  
TO BT TOXIN

Nicole Mendez  
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Mentor: Dr. Linda Gahan, Clemson University

Pesticides are used on several crops to guarantee a protection against multiple insect pests. It has come to the attention of cotton farmers that *Heliothis virescens*, commonly known as the tobacco budworm, has been destroying their crops. A Bt toxin made by a bacterium, *Bacillus thuringiensis*, will kill the budworm. Monsanto Chemical Company created a transgenic cotton plant that makes the toxin. Now farmers do not have to spray for the budworm, but they do worry that these insects will develop a resistance to Bt toxin. This research lab is concerned with identifying resistant genes to Bt toxin. For

this study, a laboratory strain of *Heliothis virescens* that is resistant to a natural pesticide called Bt toxin CryIAC was used to map one of the resistant genes, BtR6. A genetic cross was made between a YHD3 strain that contains BtR6 and a YFO strain that does not contain BtR6. The offspring were backcrossed to the YHD3 strain. These backcrossed offspring were then tested to see if they could grow on a toxin diet. DNA was isolated from both the offspring which could grow on the toxin diet (large) and the offspring that could not grow on the toxin diet (small). The DNA was digested with restriction enzymes Hind III and Pst I. It was then separated on agarose gel by electrophoresis, blotted to a nylon membrane and probed with DNA fragment known to be on different linkage groups. BtR6 mapped to linkage group 2.

#### PALEOECOLOGICAL CHANGES OF THE CONGAREE RIVER FLOODPLAIN USING PALYNOLOGY AND PH OF PEAT

Michelle A. Metzler

South Carolina Governor's School for Science and Mathematics

Mentor: Dr. Arthur D. Cohen, University of South Carolina

Peat is black or brown organic sediment formed from the decomposition of plant material found in wetlands. The peat used in this research was obtained from a groundwater swamp in the Congaree National Park, locally called Muck Swamp. The primary purpose of this study was to research whether or not pH changes occurred through a core of peat, and secondarily, whether variations in vegetation communities indicated by changes in pollen contents affected pH values. We discovered that a twenty-four hour equilibrating period (or perhaps less) is sufficient for the peat used, as our results from the twenty-four and seventy-two hour equilibrating periods were very similar. The results indicated that all samples were acidic (below pH 7), ranging from 3.87 to 6.71. Additionally, pH tended to increase with depth except in one core that had an anomalously lower zone with depth. Because the peaks and valleys of the pH graphs did not correlate well with one another, the pH results were compared to palynomorphic graphs, which represent pollen contents of soil as they change over time. However, at this point no correlation was found between the two sets of data and further research is necessary.

#### THE EFFECT OF AN ELECTROLYTE SUPPLEMENT ON FORMATION OF LACTATE DURING INTENSE EXERCISE: A RANDOMIZED, DOUBLE-BLINDED, PLACEBO-CONTROLLED STUDY

Payne Montgomery

Spring Valley High School

This study addressed the effect of an electrolyte supplement on the formation of lactate during intense exercise. The purpose of this study was to determine if a simple endurolyte pill could affect lactate levels in the blood, either by inhibiting lactate formation so it cannot be metabolized, or by converting pyruvate into another metabolite for more efficient energy under high levels of strain. The application of this study is focused on seriously trained athletes, who could turn to electrolyte pills to help raise energy levels and reduce fatigue as well as prevent muscle cramps, nausea, and swelling of the extremities. It was hypothesized that the electrolyte supplement would not change the amount of blood lactate. Results showed lower lactate levels with the placebo ( $\bar{x}$  = 3.06,  $S_d$  = 1.26) than the electrolyte ( $\bar{x}$  = 3.90,  $S_d$  = 2.60). As well, there was a lesser change with the placebo ( $\bar{x}$  = 0.97,  $S_d$  = 1.26) than with the electrolyte ( $\bar{x}$  = 3.1,  $S_d$  = 1.56). The blood-lactate results were analyzed using dependent samples t-tests at the ninety five



percent confidence level. The t-test analyzing absolute change reported a significant effect,  $t(5)=-2.82$ ,  $p=0.037$ , with a greater change in the electrolyte in the placebo. The t-test analyzing percentage change reported no significant difference,  $t(5)=-1.56$ ,  $p=0.18$ .

DECREASED OREXIN INNERVATION TO THE BASAL FOREBRAIN  
CHOLINERGIC SYSTEM ATTENUATES ACETYLCHOLINE EFFLUX IN AGED  
ANIMALS

Kristen Morin

South Carolina Governor's School for Science and Mathematics  
Mentor: Dr. Jim Fadel, University of South Carolina School of Medicine

The basal forebrain cholinergic system (BFCS) is a crucial element in the neurobiological systems responsible for attentional function. The BFCS mediates its cognitive effect through the neurotransmitter acetylcholine (ACh), whose dysfunction is implicated in the cognitive decline of those with Alzheimer's disease. One family of neurons, dually named orexin and hypocretin, has fibers that extend from the lateral hypothalamus/perifornical area to the BFCS. The binding of orexin neurotransmitters to their receptors in the cholinergic system causes a release of ACh. There appears to be a deficit in the activation of the BFCS in aged animals perhaps due to an age-related degeneration of orexin neurons. In order to test this hypothesis, four aged rats were mildly food deprived and trained for one week to associate sudden darkness with food. *In vivo* microdialysis and dialysate analysis with HPLC allowed us to monitor the ACh efflux in aged rats and illustrate the age-related attenuation of ACh as hypothesized. Infusing orexin-A stimulated cortical ACh release indicating that ACh efflux in aged animals remains responsive to direct administration of orexin. Immunohistochemistry of the brain tissue of aged rats indicated the decrease of innervating orexin projections into the BFCS. The depletion of orexin neurons near the BFCS could be connected to the decrease in ACh efflux and thus the decrease in attentional function related to food. Future projects could use these results as a basis to investigate orexin as a possible therapeutic target for treatment of cognitive decline.

THE EFFECT OF THE DISTANCE EXPECTED TO RUN ON THE PERCEIVED  
AMOUNT OF PAIN

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Spring Valley High School

It is known that the mental state of a runner does affect his/her perceived amount of pain and therefore performance. The currently accepted theory dealing with how pain develops in the body is called the Central Governor theory. This states that the pain a runner feels is due to their mind pacing the body. The mind doles out pain symptoms in order to hopefully slow the activity down before the body actually runs out of fuel or cause severe damage to itself. The purpose of this experiment was to test how the distance a runner expected to run affects the pain symptoms doled out by the runner's mind. It was hypothesized that the greater the distance the runner expects to run, the less amount of pain they would experience. On three separate days, the runners were first told to run 1600 meters, then 800 meters, and finally 3200 meters. However, during each trial, the runners were either forced to continue or forced to stop in order to make the total distance ran 1600 meters for each trial. The amount of pain each runner experienced was recorded after each trial. An ANOVA test revealed that there was no significant difference between the amount of pain experienced for the expectations of

1600 meters, 800 meters, and 3200 meters at the  $\alpha = 0.05$  level ( $F = .6533$ ,  $p = .5284$ ). This means that the experimental hypothesis was rejected because the difference in the amount of perceived pain for each trial was not significantly different.

CONSTRUCTION OF RETROVIRUS VECTORS FOR IMMORTALIZATION OF  
PRIMARY TONSIL EPITHELIAL CELLS: AN *IN VITRO* MODEL FOR  
NASOPHARYNGEAL CARCINOMA

Marissa Michelle Moultrie

South Carolina Governor's School for Science and Mathematics

Mentor: Dr. Natalie Sutkowski, Medical University of South Carolina

Undifferentiated Nasopharyngeal Carcinoma (NPC) is a highly aggressive head and neck cancer that is almost always associated with Epstein Barr Virus (EBV). EBV is one of the most common human viruses and most people who become infected with it will have it for life. NPC's association with EBV is that EBV's oncogenes, LMP 1 and LMP 2, initiate the cancer and they also induce the superantigen HERV-K18, which activates a vast T cell response. T cells are white blood cells that are supposed to kill the cancer but in this case, help it grow. The hypothesis was that development of NPC is a multi-step process involving immortalization of epithelial cells, transformation with EBV oncogenes, and tumor progression with the aid of HERV-K18 activated T cells, therefore, *in vitro* studies were performed to simulate the multi-step process described in our hypothesis. When primary tonsil epithelial cells were infected with retrovirus vectors containing the EBV oncogenes, LMP 1 and 2, they were unable completely to transform the cells. The transformation was very low, and a helper plasmid needed to be created. The plasmid contained SV40 T antigen or hTERT, which was created by ligating the SV40 T antigen or hTERT insert into pQCXIN. Next, Plasmids were used to transfect a helper cell line to produce vector particles and these particles were then used to infect primary tonsil epithelial cells. It was expected that the cells infected with the new retroviral vector that delivered SV40 T antigen would have a higher efficiency. Demonstration of vector activity required several additional weeks of culturing, at which point non-immortalized cells would stop growing. Construction of the hTERT vector is an ongoing research project.

CAN YOU HEAR IT NOW? AGE, GENDER AND DISTANCE EFFECTS ON THE  
ABILITY TO HEAR THE "MOSQUITO" RING TONE

Justin Murphy

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Approximately a year ago a new cell phone "ring tone" was made available. Supposedly, only teens and children can hear the ring tone, but not adults. The purpose of this experiment was to test the validity of this claim. It was hypothesized that the younger group (under 18 years of age) could hear the ring tone, and the majority of adults (over 18 years of age) could not hear the ring tone. It was also hypothesized that females would hear the ring tone more frequently than the males of their own age group. Various human subject were examined individually in a room at three different distances, the ring tone was played at different intervals, with the phone hidden from view. The subjects were asked to raise their hand while the ring tone was on, and to put it down when the ring tone was off. The results showed that the hypothesis was supported and that age and gender are each dependent on the ability to hear the ring tone, but distance had no affect.

**IN VITRO INHIBITION OF DIFFERENTIATION OF MONOCYTIC PRECURSORS  
INTO OSTEOCLAST VIA OSTEOCLAST INHIBITORY PEPTIDE-1 (OIP-1)**

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Mentor: Dr. Sakamuri V. Reddy, Medical University of South Carolina

Osteoclasts (OCL) are the primary cells in the body that are responsible for the destruction of bone (this process is called resorption). The cells are in equilibrium with osteoblasts (bone forming cells) and are responsible for bone homeostasis. Their differentiation is caused by the interaction of receptor activator of nuclear factor (NF)- $\kappa$ B (RANK), located on monocytic precursors, and receptor activator of NF- $\kappa$ B ligand (RANKL). The aim of this research is to find the optimal concentration of RANKL for OCL differentiation *in vitro*. Primary cell from human peripheral blood and mouse bone marrow, along with secondary cell lines from RAW 264.7 were used to culture OCL with concentrations of RANKL and Vitamin D<sub>3</sub> ranging from 0-100ng/mL, along with Macrophage Colony Stimulating Factor (M-CSF) (10ng/mL). Vitamin D<sub>3</sub> was also used due to its ability to stimulate OCL differentiation. Microscopic evaluation of the OCL cultures showed that 50ng/mL of RANKL proved to be the best concentration for OCL differentiation. OCL Inhibitory Peptide-1 (OIP-1/hSca) has been proven as a successful inhibitor of OCL differentiation *in vivo* (7). Once the optimal concentration of RANKL for OCL differentiation was determined, cells were cultured using mouse bone marrow with RANKL (50ng/mL) and M-CSF (10ng/mL), along with concentrations of OIP-1/hSca ranging from 0-100ng/mL. Microscopic evaluation of the cultures showed that the greater the concentration of OIP-1/hSca, the fewer OCL that differentiated. This shows that OIP-1/hSca is an effective inhibitor of OCL differentiation *in vitro*.

**THE EFFECTS OF VACUUM PRESSURE DURING THE INSTALLATION  
PROCESS OF THE PIEZOELECTRIC WAFER ACTIVE SENSOR**

Nathaniel George Myers III

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Mentor: Dr. Victor Giurgiutiu, University of South Carolina

In the next three years NASA will be adopting the Crew Exploration Vehicle (CEV) to replace the space shuttle. These CEVs use *massive* fuel tanks that undergo extreme amounts of pressure in order to stabilize the nitrogen and oxygen fuel. As a result of the pressure, cracks develop in the tank, creating weakened and damaged areas. As a way to understand the severity of the damage, the Laboratory for Active Materials and Smart Structures (LAMSS) in the Department of Mechanical Engineering at the University of South Carolina is developing piezoelectric wafer active sensors (PWAS) that are able to detect damage in the shell of the fuel tanks via the transmission of Lamb waves. The PWAS is constructed like a capacitor: *pzt*, the *piezoelectric material*, separates two 7mm diameter *silver nickel* electrodes. When an AC voltage is applied to the PWAS, a mechanical strain is generated, causing the PWAS to vibrate. These vibrations transmit through the substrate the PWAS is embedded on, sending out lamb waves that reflect off of the substrate boundaries and back to the PWAS. Based off of the piezoelectric phenomenon, these vibrations provide the mechanical strain that induces a voltage into the PWAS, which is then displayed on an oscilloscope to be analyzed. When installing the PWAS into a substrate, it must undergo a substantial amount of vacuum pressure. The applied pressure to the PWAS affects how well the PWAS transmits its energy into the substrate. Tests are being run to determine the amount of vacuum pressure applied to the PWAS that will optimize the energy packets sent out into the substrate.

THE EFFECT OF LEAD CONCENTRATION ON THE GROWTH RATE OF  
BUCKWHEAT WITH SPECIAL REFERENCE TO PHOTOREMEDIATION  
APPLICATIONS.

Christopher M. Pasco  
Spring Valley High School

Determining the photoremediation abilities and lead tolerance of buckwheat will greatly increase the benefit photoremediation projects can provide. Heavy metals are increasing natural hazards. Lead is a heavy metal that causes brain damage or death in animals and kills plants. It can contaminate water and soil by being mobilized by acid rain, seeping from lead based products, or being released by factories. Buckwheat (*Fagopyrum esculentum* variety Moench) is inexpensive, grows fast, a lead hyperaccumulator, and is a hardy common plant. If proven to remediate soil buckwheat could be utilized for removing lead contamination. Buckwheat was tested in varying concentrations of lead to determine the range of lead tolerance. It was hypothesized that buckwheat would survive best at levels of lead below 6.175g and a negative impact will be observed above 6.175g. An accompanying hypothesis was that buckwheat grown at or below 6.175g would remediate 90% of the lead. Buckwheat was grown in Rockwool Cubes™ for two weeks and randomly separated into four groups. Plant heights were measured in centimeters, and then each group received a different concentration of lead in hydroponic solution. Height was measured once a week for three weeks. After three weeks plant lead concentrations were determined using an ICP mass spectrometer. Results were statistically analyzed at the  $\alpha = .05$  significance level with an ANOVA. The percentage of lead removed was small but the highest stored concentration was 107452mg/kg. Buckwheat in lead levels below 6.175g grew the best.

ISOLATION OF LOW MOLECULAR WEIGHT HYALURONAN OLIGOMERS FROM  
HIGH MOLECULAR WEIGHT HYALURONAN

Nick Patel  
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Mentor: Dr. Bryan P. Toole, Medical University of South Carolina

Hyaluronan is a polysaccharide with many different potential applications, ranging from treating knee osteoarthritis to treating various types of cancer. It is a glycosaminoglycan, which it is made up of many repeating units of a disaccharide. Glucuronic acid and n-acetyl glucosamine are the disaccharide that make up hyaluronan. The hyaluronan that our cells produce have a very high molecular weight and comes out of the cell to bind to the CD44 receptors. This interaction helps promote the immortality of cancer cells. This can be prevented by the addition of low molecular weight hyaluronan, which interferes with the interaction of high molecular weight hyaluronan and the CD44 receptor. Preventing this interaction will make tumor cells more susceptible to various medications and will be essential in finding an effective treatment to cancer. Low molecular weight hyaluronan was successfully isolated via enzymatic cleavage.

PARTICULATE PHOSPHORUS BIOGEOCHEMISTRY OF SAN PEDRO BASIN, CA

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Mentor: Dr. Claudia R. Benitez-Nelson, University of South Carolina

The San Pedro Basin, located off the coast of Southern California, has undergone considerable alteration in its marine ecosystem over the past several decades. To investigate the role of P in San Pedro Basin ecology, this study focuses on determining

the amount of P present in sinking particles. Samples were collected from depths of 550 m and 800 m using a deep-moored sediment trap with a 0.5 m<sup>2</sup> opening. The collection period lasted from October of 2005 through March of 2006 with the trap consisting of 21 trap cups programmed to rotate every eight days. Sediment samples were then processed and analyzed for the presence of P in its organic and inorganic forms. Through this analysis, it was found that the process of analyzing sediments must not only account for P in the particulate matter, but also for that in the supernatant and rinse waters used for processing, something which various previous studies have not accounted for. Our study shows that, if only the particulate matter of the sediment samples were analyzed, approximately 67% of the P would not be accounted for.

#### THE EFFECTS OF GLUCOSE, SUCROSE, AND FRUCTOSE ON RUNNING PERFORMANCE

Vladimir Plotkin  
Spring Valley High School

Many people do not know what specific sugars are most favorable for their running performance. Numerous sports drinks are available, as well as snacks. They do not know which sugars they should look for when they choose a drink or snack. The purpose of this experiment was to determine which sugar is the most beneficial for running. It was hypothesized that glucose would shorten running time the most, followed closely by sucrose, followed by fructose. Twenty grams of each of these sugars was mixed with water to produce a sugar-water solution that was given to project participants. Additionally, a trial was conducted in which a sugar substitute (sucralose) was given to the participants. The participants ingested the solutions on separate days, and they ran a mile ninety minutes after consumption. Their times were recorded. An ANOVA test revealed that significant differences existed between the no sugar-water and sucrose, no sugar-water and fructose, glucose and sucrose, and glucose and fructose at the  $\alpha=0.05$  level ( $F=0.5571$ , and  $p=0.03$ ). The shortest mean time was recorded for fructose, followed closely by sucrose, followed by glucose, followed by no sugar-water solution.

#### THE EFFECTS OF ACID PRETREATMENTS ON THE PRODUCTION OF REDUCING SUGARS DURING THE ENZYMATIC HYDROLYSIS OF BIOMASS

Daniel Roberts  
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Mentor: Dr. Terry Walker, Clemson University

The goal of this research was to find a more cost effective manner of producing ethanol by focusing on the enzymatic hydrolysis stage of the procedure. The hydrolysis breaks down cellulose into glucose, which is then fermented into ethanol, making the objective to produce the most glucose possible from a set amount of cellulose. To increase the efficiency of the reaction, acid is used to cleanse the biomass of as many inhibitors as possible. Two acid pretreatments, with the differing variable being the time the acid was allowed to act, were tested on three biomasses: *Arundo donax* (giant reed), corn stover, and Avacil. The "cleansed" biomasses were used in identical enzymatic breakdowns resulting in a liquid sample. These samples were then tested for the amount of reducing sugars by using dinitrosalysilic acid (a color changing agent) and a spectrophotometer. It was found that allowing the acid to sit for an extra 19 hours did not benefit the results. The pretreatment without the time lag achieved the best results and the *Arundo donax* was the best biomass to use. The combination of the two resulted in almost double the amount of reducing sugars produced by the next best combination.

## THE EFFECT OF MUSIC ON BEHAVIOR WHILE PLAYING A VIDEO GAME

Christopher J. Sach  
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The purpose of this study was to discover the effect of music on behavior while performing a particular task, which is vital to today's society of violent music, movies, and video games. It was hypothesized that violent songs (such as rock and rap) would cause a raise in hostility while classical music will reduce hostility. Participants played a video game while listening to different genres of music, filling out the State Hostility Scale after each song. An ANOVA test and Paired T-tests showed that there was no significant difference between the hostility when playing with no music compared to the hostility when playing with any genre of music.

## THE MORPHOLOGICAL ANALYSIS OF SYMMETRY IN *DROSOPHILA MELANOGASTER*

Max Schilling  
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Mentor: Dr. Timothy A. Mousseau, University of South Carolina

Aside from causing the deaths of more than thirty people initially, the Chernobyl nuclear reactor disaster in 1986 produced high levels of radiation throughout a twenty mile radius surrounding the plant and produced a large cloud of radioactive fallout that drifted across the European continent. Not surprisingly, this catastrophe had a significant effect upon the wildlife near the site of the explosion as well as all across Ukraine. During this experiment, the effects of the radiation exposure on the fitness of fruit flies (*Drosophila melanogaster*) were investigated. This was accomplished through the breeding of flies from areas in various parts of the Ukraine and measurement of abnormality in the symmetry of the offsprings' wings. This regularity is important because, as in many animals, the symmetry of the organism's body structure is directly related to the individual's health. The wings from samples of *Drosophila melanogaster* were removed, preserved between microscope slides, and photographed. Using morphological techniques, patterns of fluctuating asymmetry in wing venation were statistically examined to test the hypothesis that elevated radiation exposure would influence development. In addition to the symmetry of the wings, a study of the sperm produced by male flies from Ukraine was conducted. Because the process of spermatogenesis is highly sensitive to changes in the environment, it was hypothesized that the gametes themselves could be used as an indicator of mutation load and fitness. Sperm was extracted and then single cell electrophoresis (comet) assays to examine the level of mutation within the specimens were performed.

## THE EFFECT OF VARIOUS COMBINATIONS AND CONCENTRATIONS OF NISIN AND LYSOZYME ON THE SURVIVAL OF *LISTERIA MONOCYTOGENES*

Adrielle Shaffer  
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Mentor: Dr. Paul Dawson, Clemson University

The effect of various combinations and concentrations of nisin and lysozyme on the survival of *Listeria monocytogenes* was determined for precooked meat samples by two experiments. In the first experiment, nisin concentrations of 5, 10, and 20 mg/ml in nisin to lysozyme ratios of 1:0, 1:1, 1:2.5, and 1:5 were placed on bologna squares and inoculated with *L. monocytogenes*. Samples were held at room temperature for two hours and then plated to determine the surviving population of *L. monocytogenes*. A 3 to

5 log reduction in bacterial counts were obtained for 10 mg/ml nisin with 1:5 ration and 20 mg/ml nisin at 1:1, 1:2.5, and 1.5 rations. In the second experiment, nisin along at 20 mg/ml, lysozyme alone at 100 mg/ml, and the combination of these treatments were compared to no antimicrobial for inhibiting *L. monocytogenes* on bologna. A 1.43- $\log_{10}$  reduction was found with nisin alone, 0.26- $\log_{10}$  reduction with lysozyme alone, and 4.31- $\log_{10}$  reduction when using both. The same method was used for both experiments. These results could be used to reduce the prevalence of *L. monocytogenes* in precooked meats, which would reduce the occurrence of listeriosis, a disease caused by ingesting *Listeria monocytogenes*, as well as increasing the shelf-life of precooked meats.

#### THE EFFECTS OF LOW FREQUENCY VIBRATIONS ON THE BEHAVIOR OF *GROMPHADORHINA PORTENTOSA*

Nadia M. Shamsedin  
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Abnormal animal behavior prior to earthquakes has been noticed for centuries. It is a topic still discussed in the scientific community today. The Chinese used accounts of abnormal animal behavior to help with the successful prediction of the Haicheng earthquake of 1975. The purpose of this experiment was to determine the effect that low frequency vibrations have on the behavior of *Gromphadorhina portentosa*. It was hypothesized that as the frequency increased, the amount of movement of the *Gromphadorhina portentosa* would increase. A laptop with frequency generating software was connected to an amplifier. The amplifier was connected to a speaker, which was taped to the bottom left of a cage containing *Gromphadorhina portentosa*. The frequencies of 0 Hz, 1 Hz, 2 Hz, and 3 Hz were then emitted. Each trial observed fell into a level of movement: little to no movement, medium movement, and a lot of movement. Each level was assigned a value and an ANOVA test was conducted at the 0.05 significance level. It revealed that a significant difference existed between at least two of frequencies. A Tukey Test was then conducted and revealed that there was no significant difference between the levels of movement for 0 Hz and 1 Hz. However, for all the other frequencies tested, there was a significant difference among the amount of trials that were in each level of movement. This supports the hypothesis that as the frequencies increased, the level of movement increased.

#### THE EFFECT OF CAFFIENE ON INSECT BEHAVIOR

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In this study, it was investigated whether insects have developed the ability to recognize caffeine due to its dangers and avoid any caffeine contaminated substance. If this is true, farm owners can protect crops with a tea of coffee-derived spray rather than chemical insecticides. To investigate this, two experiments were set up, one outdoors, and one controlled indoor experiment. In the outdoor experiment, five plants with significant plant damage were selected and sprayed with tea and any additional insect damage was observed. Since no additional insect damage was observed on the sprayed plants, it was hypothesized for the indoor experiment that insects would not eat tea-sprayed plants or food. The indoor experiment was run using caterpillars. Different forms of tea were placed on the food of the caterpillars: dried tea leaves, boiled liquid tea, and evergreen bush leaves dipped in boiled liquid tea. One group of caterpillars was left alone to serve as a control. Observations showed that the caterpillars did not avoid the tainted food as hypothesized and entered metamorphosis. However, two caterpillars died in the cocoon

stage and nine of the surviving butterflies had deformations which were represented by folded and wrinkled wings. The dry tea leaves were the most fatal causing four butterflies to be deformed and the substance killed one caterpillar. The liquid tea caused all five butterflies in the jar to become deformed. There were four normal butterflies and one dead butterfly in the dipped leaf jar. The control group consisted of four normal butterflies.

#### THE EFFECT OF E-MAIL MESSAGE FORMATTING ON RESPONSES

Stephanie K. Slaughter  
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Millions use the Internet everyday in the world and virtually no one is a stranger to e-mail. It is important to know what affects social interaction over the Internet. The purpose of this experiment is that it would benefit anyone who uses the Internet as a way to communicate. It was hypothesized that if a message sent was longer and had more formatting then there would be more people responding to it. In this experiment, two human consent forms were written to send over the Internet via MySpace.com. Message 1 had less formatting and message 2 had more. Each message was sent to 75 people and the number of responses as well as the age and gender of the respondents was recorded. For message 1, only 5.3% responded and message 2 had 22.7% respond. There was no correlation shown between age and gender and responses except in general, more females responded. A Chi-square test for independence was used and it was determined that the number of people responded was dependent on the message sent. In conclusion, the formatting of a message does have an affect on the number of responses given.

#### THE EFFECT OF SUGAR ALCOHOLS ON *STREPTOCOCCUS MUTANS* AND THE PREVENTION OF DENTAL CARIES

Lauren C. Snider  
Spring Valley High School

The purpose of this experiment was to provide the general population with a comparison of the various brands of Wrigley's sugar free chewing gum containing different amounts of sugar alcohol on the reduction of bacteria. Also, another comparison was made to determine whether the sugar alcohol solution or the product containing the sugar alcohol was more effective in the prevention of dental caries. It was hypothesized that either sugar free chewing gum that was comprised of xylitol or pure xylitol would suppress *Streptococcus mutans* growth more than other sugar free chewing gums containing sorbitol or maltitol or pure forms of maltitol and sorbitol; consequently, preventing dental caries. This was accomplished by simultaneously culturing saliva stimulated by chewing gum or by rinsing with a sugar alcohol solution with plaque from the enamel of a canine tooth in thirty milliliters of nutrient broth. The formation of plaque was initiated by chewing plaque-causing carbohydrates. The nutrient broth test tubes were incubated for twenty-four hours; allowing the growth of *Streptococcus mutans*, the bacteria causing dental caries. The growth of the bacteria was measured using a visible light spectrophotometer. In order to analyze the data, a one-way ANOVA test was completed. These analyzed results revealed that there was not a significant difference between any of the sugar free chewing gums on the growth of bacteria. Consequently, this reveals that chewing sugar free chewing gum after a meal might not have as great an effect on the prevention of dental caries as consumers are led to believe.



APPLYING TWO PHOTON MICROSCOPY TO INVESTIGATE THE FUNCTIONAL ORGANIZATION OF THE RAT VISUAL CORTEX IN VIVO

Rohit Sreedharan

South Carolina Governor's School for Science and Mathematics  
Mentor: Dr. Prakash Kara, Medical University of South Carolina

In this experiment, we are trying to prove that the cells in the visual cortex of mammals such as rodents have a specific orientation and react to individual stimuli. Our hypothesis is that the lack of functional organization influences the degree of orientation tuning in single cells. In order to see which neurons are triggered by each stimulus, we needed to expose the specific part of the brain we are trying to image, called the visual cortex. In order to ascertain whether such an organization exists in this area, we experimented on rats. We used surgical procedures to open the rat's head and expose a small part of the brain. Then a calcium-based indicator is injected, allowing for simultaneous labeling of the neurons that are almost 300  $\mu\text{m}$  in diameter. The stimuli are presented as square wave gratings of a given orientation, and the readings are taken based on seeing which neurons "light up" by sending nerve signals to which the fluorescent dye is attached. Because the calcium positively correlates to the action potential in the neurons, changes in fluorescence give an accurate reading of neuronal responses. A bright light meant that the cell was sending more signals. Using two-photon microscopy to image the brain allows for deeper imaging without the fading/burning caused by earlier methods. Results show that in the rat primary visual cortex, neurons had robust orientation selectivity but there was no discernible local structure; neighboring neurons often responded to different orientations.

USE OF STANDARD WATER QUALITY PARAMETERS AS PREDICTORS OF MICROBIAL COMMUNITY CHANGES IN MARINE SHRIMP CULTURE PONDS STOCKED AT HIGH DENSITY

Lindsay K. Sturre

South Carolina Governor's School for Science and Mathematics  
Mentor: Dr. Heidi Atwood, Waddell Mariculture Center

Waddell Mariculture Center has been working with the Zeigler Bros. animal feed distributing company to compare their standard intensive shrimp diet to their new "eco-friendly" shrimp diet, which is more cost effective and environmentally safer. It is based on algal and soy protein and poultry industry waste rather than fishmeal, which is used in the standard diet. The new diet will reduce the dependence of shrimp farmers on fisheries as a source of feed and may allow the shrimp to be classified as "organic." The different diets were compared using measured water quality parameters, which include dissolved oxygen, inorganic nitrogen, chlorophyll, salinity, pH, and total suspended solids. These parameters serve as indicators of changes in the microbial community in shrimp aquaculture ponds stocked at high density (100 animals/m<sup>2</sup>).

THE EFFECT OF THREE MNEMONIC TECHNIQUES ON THE MEMORIZATION OF NAMES

Kathryn Stieglitz

Spring Valley High School

The purpose of this study was to determine the best mnemonic to use when remembering names. This can be especially helpful when meeting new people. Three mnemonic techniques were visual, audio, and face association were tested on the memorization of names and faces. It was hypothesized that the face association mnemonic would be the

best mnemonic technique. Subjects viewed slideshows in which each slide had a picture of a face and a name presented in some way. Each mnemonic had a slideshow with ten slides, and a slideshow test with the same faces but in random order. When seeing the faces again on the test, subjects were told to write the name they remembered. Data were analyzed by using a one-way ANOVA and a post hoc Tukey test. The results did not support the hypothesis. The mnemonic with the highest average of correct names was the audio mnemonic. The mnemonic with the most variation was the face association mnemonic. The only mnemonics with a significant difference between their means were the visual and audio mnemonics.

#### THE EFFECT OF VERMIN COMPOSTING ON BIODEGRADABLE BOTTLES

Troy D. Szadek  
Spring Valley High School

The question being addressed was will biodegradable bottles, which decompose within twelve weeks in a regular compost pile, break down faster in a vermin composting pile. Since the biodegradable bottles are stated to decompose into water under proper conditions which include being opened, emptied, placed in high heat, humidity, and in the presence of microorganisms, worms may have the same effect on the bottles as they do on organic wastes. It was hypothesized that if worms were included in the compost pile with biodegradable bottles, the speed at which the bottles decompose will increase. Two plastic bins were placed in the same environment, each containing the same type and amount of soil and thirty BIOTA biodegradable plastic water bottles. The first bin represented the regular composting process and contained no worms. The second contained 200 worms. This bin tested if the inclusion of worms assists in the decomposition of the bottles and if worms in general will break down the bottles faster than the control with no worms. The bottles were monitored for six weeks and at the end of the twelve weeks the bottles were taken out and mass and volume recorded. Results were statistically analyzed at the 0.05 significance level using a t-test. The t-test revealed that significant difference was present between the bottles in volume, but not in mass. The hypothesis was supported that Vermin Composting did assist in decomposing the bottles.

#### DEVELOPING AN AUTOMATIC ALGORITHM TO UPDATE THE DATABASE OF BACTERIAL NUCLEOSIDE MONOPHOSPHATE KINASES

Kemper Talley  
South Carolina Governor's School for Science and Mathematics  
Mentor: Dr. Emil Alexov, Clemson University

Bacterial monophosphate (NMP) kinases are enzymes that convert monophosphate nucleosides into diphosphate nucleosides. There are five families of NMP kinases depending of the nucleoside they bind. The present issue of the database contains 1770 entries (as of July 2006) of which 966 are two-chain protein complexes and 804 are one-chain proteins parsed into two domains. The work presented here describes the automatic algorithm and what it relates to in the project. The algorithm was developed using C++ and Linux operating systems. An automatic algorithm is now usable to upgrade the databases more efficiently and quickly. The database is updated regularly. The future aim of the project is to use the results and to predict the 3D structure of all members within each family.

A COMPARISON OF THE EFFECTIVENESS OF ULTRAVIOLET LIGHT AND  
CHEMICAL DISINFECTANTS ON THE STERILIZATION OF COMPUTER  
KEYBOARDS

Brett D. Taylor  
Spring Valley High School

Ultraviolet light has been known to kill bacteria for over 50 years now and is growing in popularity as a method of sterilization. Ultraviolet light is already being used in industries to sterilize/disinfect everything from foods, to hospitals, and water. Chemical disinfectants have been proven effective, but can release toxic chemicals into the environment. These harmful disinfectants have drawn interest toward alternate methods of sterilization, such as the use of ultraviolet light. The purpose of this experiment is to test the effectiveness of ultraviolet light as an alternative method. Ultraviolet light and chemical disinfectants were used to disinfectant computer keyboards in this study.

It was hypothesized that ultraviolet light would sterilize the keys more effectively than the chemical disinfectants would. Keyboard keys were all sterilized with bleach and subsequently subjected to bacteria. The keys were then subject to ultraviolet light, Lysol, or Clorox. The bacteria used include *Serratia marcescens*, *Staphylococcus epidermidis*, and *Escherichia coli*. Two of these bacteria are gram- negative bacteria and one the *Staphylococcus epidermidis* is a gram-positive bacteria. Of the three bacteria tested, Lysol and Clorox were the most successful in reducing bacterial populations of *Serratia marcescens* on computer keyboards. There were no significant results found about the germicidal effectiveness of ultraviolet light for any of the three bacteria studied. There were noticeable differences in the size of the bacterial populations after exposure. For example, the Lysol and Clorox were more effective in reducing the *Serratia marcescens*.

PREDICTION OF TENSILE PROPERTIES OF STEEL WELDS FROM HARDNESS  
VALUES

Michael Patrick Tkacik  
South Carolina Governor's School for Science and Mathematics  
Mentor: Dr. Yuh J. Chao, University of South Carolina

The correlation between the hardness and the tensile properties (yield stress and ultimate tensile stress) for spot weldments are investigated by this research. The various zones of a weldment have differing tensile properties, the knowledge of which is important for the determination of structural safety. However, it is difficult to measure directly the tensile properties of the weldment. This is partly due to the rapid change of the material properties of the nugget and the Heat-Affected-Zone. Also, it is nearly impossible to prepare the standard tensile testing specimens from the actual weldment. Therefore, this study focuses on the indirect method for obtaining the tensile properties of the weldment from the empirical relationship between material strength and the hardness. In order to obtain this relationship, a large amount of experimental data for steels was collected and analyzed. A linear relationship can be found between the hardness and the tensile properties irrespective of steel types. The prediction method including equations proposed is based on this relation. The predictions show good agreement with the experimental data, suggesting that the proposed method has high potential in predicting with high accuracy the tensile properties from the hardness for spot-weld material.

CHIMERIC GENE CONSTRUCTION FOR GENETICALLY ENGINEERING  
DROUGHT AND SALT TOLERANCE IN TURFGRASS

Christopher P. Walling  
South Carolina Governor's School for Science and Mathematics  
Mentor: Dr. Hong Luo, Clemson University

As parts of the world are experiencing a depletion of water and a salinization of soil and water, it is important to have plants that are salt and drought tolerant. The *Arabidopsis AVP1* gene encodes vacuolar H<sup>+</sup>-pyrophosphatase. It has been demonstrated that overexpression of *AVP1* in both *Arabidopsis* and tomato results in enhanced capability of transgenic plants in water retention and root growth, and consequently salt and drought tolerance in transgenic plants. In order to do this with turfgrass, a chimeric gene construct for turfgrass transformation was made to produce transgenic plants with enhanced abiotic stress tolerance. The coding sequence for the *AVP1* gene under the control of the CaMV 35S promoter was cut from an intermediate vector, pRG389, by restriction digestion and cloned into the binary vector, pSBUBibarB containing a rice ubiquitin promoter driving an herbicide resistance gene, *bar*. The resulting construct, pSBUBibarB/35S-AVP1 was then introduced in *Agrobacterium tumefaciens* for turfgrass transformation in the near future.

DATA MINING TOOLS AND THEIR APPLICATION TO THE NATIONAL OCEAN  
ECONOMICS PROGRAM

Daniel A. Ward  
South Carolina Governor's School for Science and Mathematics  
Mentor: Dr. George Pothering, College of Charleston

The National Ocean Economics Program (NOEP) gathers demographic and economic data from counties across the country. The goal of this research is to use data mining tools and applications to develop a general economic profile of shoreline counties in the Southeast based on NOEP data. Backpropagation neural networks and Intelligent Data Analysis (IDA) software were used to examine data in Microsoft Excel. Results from neural network and IDA software were analyzed to determine the economic properties of shoreline versus non-shoreline counties. Neural Networks showed that coastal and non-coastal counties are significantly different economically by being able to predict whether or not a county is coastal based solely on NOEP data with over 94% accuracy. IDA software showed that the most significant difference between coastal and non-coastal counties is the average household size, or total population divided by total housing. Neither method, however, gave a direct economic profile of each kind of county. The overall results of this research show that shoreline and non-shoreline counties are different economically, but no general profiles or methods of discrimination were found.

THE EFFECT OF PROPELLER LENGTH AND TWIST ON THE POWER OUTPUT  
OF TIDAL TURBINES

Taylor C. Wells  
Spring Valley High School

Finding sources of renewable energy has become a high priority in our society. Tidal turbines are a fairly new and undeveloped technology that has the potential to yield huge dividends as an alternative energy source. The purpose of this study was to determine if variations in propeller length and twist affect the power output of tidal turbines. It was hypothesized that the longer blade with the larger twist would be more effective (165mm, 18° propeller). Each propeller was placed in an aquarium with a

pump, and the revolutions/minute of each propeller was recorded. A Two-way ANOVA was performed, and it revealed that there were differences between twist and length, and that there was no interaction between the two variables. Therefore, a separate ANOVA and Tukey Test were performed for both length and twist to determine where the differences revealed in the Two-way ANOVA lied. All of the tests were performed at the  $\alpha = 0.05$  significance level, and the Tukey Tests revealed that there was a significant difference between both lengths as well as between each of the three twists. The most productive combination was the 152mm, 18° propeller. Therefore, the hypothesis that the most effective twist would be 18° was confirmed, but the length hypothesis was not confirmed because the 152mm propeller had more revolutions/minute than the 165mm propeller. The hypothesis of the best combination was also rejected because the 152mm, 18° propeller was more productive than the hypothesized 165mm, 18° propeller.

#### EFFECTS OF ETHYLENE-OCTENE COPOLYMER ON THE PROPERTIES OF POLYOLEFIN BLOWN FILMS

Edgar White

South Carolina Governor's School for Science and Mathematics  
Mentor: Dr. Amod Ogale, Clemson University

The objective of this research project is to investigate the effects of the ethylene octene copolymer known as "Engage" on the properties of polyolefin blown films. This copolymer is able to improve the adhesive properties of polypropylene (PP) and low-density polyethylene (LDPE) bilayer blown films. The advantage of a bilayer film is that it is able to exert properties from both of the films that have been bonded together. Normally PP and LDPE are immiscible but when Engage is added to the film they are able to adhere to each other. This is possible because Engage is a metallocene based and linear low density polymer which is able to bond to both LDPE and PP. Varying amounts of Engage were added to each polymer in the films. Engage was only added to one layer at a time.

#### MANIPULATING THE BOND OF PACKAGING ADHESIVES

Ian Wood

South Carolina Governor's School for Science and Mathematics  
Mentor: Dr. Duncan Darby, Clemson University

In the flexible packaging industry, adhesives are used frequently to bond two sheets of material together with strength in excess of 300-500 g/in. This goal of this research was to test the effects of several variables on the adhesive bond levels of two commercially available "work-horse" adhesives. These variables include lamination temperature, basis weight, and added talc that could interfere with the bond. By finding a way to repeatedly alter the bond strength to a desired value, the properties of different bond strengths can be better tested.

#### HIERARCHICAL ORGANIZATION OF VIRUSES FOR THE DEVELOPMENT OF FUNCTIONAL CELL MEMBRANES

Michelle Zhang

Spring Vally High School

Tissue regeneration is currently a hot topic of research, primarily due to its projected contributions to the medical field (especially considering the lack of organ and tissue donors). Nanotechnology provides a means of manipulating objects (for example, cell

organelles) on the nanoscale (5-100 nm). The main benefit of working on the nanoscale is the amount of control it offers, especially since there are only a few methods to manipulate things on the nanoscale. Viruses are capable of self-assembling there are many ways to modify them, allowing for flexibility in establishing and utilizing the templates. This study focuses on assembling tobacco mosaic virus (TMV) and bacteriophage  $\lambda$ X174 into two-dimensional arrays at liquid-liquid interface, in an attempt to simulate the actual cell environment. Methods utilize an aqueous and organic phase, with a variety of concentrations of different metal ions in the aqueous phase. TMV was successfully assembled, while the phage could not be assembled since sufficient quantities were not obtained during purifications.

END

South Carolina  
Junior Academy of Science  
2007 Meeting Abstracts

## SCJAS STUDENTS:

### West Virginia Youth Science Camp (WVYSC)

Open to high school seniors who have demonstrated achievement in the area of science. The award is a four week all expenses paid experience in West Virginia near the National Radio Astronomy Observatory at Green Bank and within the unique wilderness area of the Monongahela National Forest where campers have the opportunity to network with scientists, work on research projects, visit Washington DC, and participate in many outdoor activities.

The application packet can be downloaded from the web site, [www.sciencecamp.org](http://www.sciencecamp.org). Complete information along with answers to frequently asked questions can be found at the web site. Completed applications should be sent to : Linda D. Sinclair/ State Science

(Continued on next page)

Consultant/Math and Science Unit/Office of Curriculum and Standards/  
South Carolina Department of Education/801-H Rutledge Building/1429  
Senate Street/Columbia, South Carolina 29201/[lsinclai@sde.state.sc.us](mailto:lsinclai@sde.state.sc.us)

**2006 WVYSC Winner**

**Kate Elizabeth Cummings  
SC Governor's School for Science & Math**

Kate, a senior at GSSM, plans to major in Physics in college. She participated in summer research at the Baruch Institute studying the beach plant *Vitex rotundifolia*. Kate also participates in Venture Crew 303 co-ed division of the Boy Scouts of America.

**SOUTH CAROLINA ACADEMY OF SCIENCE  
MEETING ABSTRACTS**

PRESENTER NAMES ARE IN **BOLD TEXT**

**PHOTOELECTRIC EFFECT. INTERDISCIPLINARY OUTLOOK**

**Mikhail M. Agrest**

Physics and Astronomy Dept., College of Charleston

Photoelectric Effect observed in a physics laboratory, excited the greatest brains of Humankind, penetrated all spheres of knowledge and became interdisciplinary. The importance of understanding the fundamental concepts of the Photoelectric Effect is undoubting not only for physicists, but also for numerous fields of contemporary science and technology as well as science education, history of science, etc. The interdisciplinary importance of the concept and multicultural interest to the Photoelectric Effect lead to multidimensional outlook at the phenomenon. Some aspects of the concept as well as teaching techniques that were used in Lectures and Labs for a wide variety of students' population including undergraduate Physics majors as well as liberal Arts and Sciences College students of all specialties, are considered in this work. The teaching-learning effectiveness has been increased at the College of Charleston and positive feedback was received from students and faculty at the College and some other Universities.

**THE DISTRIBUTION OF PHOSPHOLIPASE C BETA 4 IN THE MOUSE LIVER  
CHANGES WITH TIME OF DAY**

**Blakely Andrews**, Barbra Bannan, Elizabeth Meyer-Bernstein,  
and Pamela Riggs-Gelascon<sup>1</sup>

Dept. of Biology, <sup>1</sup>Dept. of Chemistry/Biochemistry, College of Charleston

A body clock is responsible for keeping all of the tissues and processes of the body synchronized. This clock causes daily oscillations throughout the body that are collectively called circadian rhythms. In the liver, these rhythms are reset by the body's fluctuations in hormones and levels of ingested food. As a consequence, the liver's ability to metabolize cholesterol, proteins and glucose, as well as drugs and toxins is optimized. The liver's success in these roles has serious consequences for all other parts of the body. To further comprehend the integral part the liver plays in the body's daily functions, it is important to first understand the influence of circadian rhythms on this organ. In the present study, we sought to determine the distribution of a particular protein in mouse liver tissue called phospholipase C-beta 4 (PLC- $\beta$ 4). We hypothesize that this protein is involved in the ability of signaling molecules from the central body clock to communicate with the circadian clock mechanism in the liver cells. We have found that over the course of the day, the total level of this protein oscillates as well as its cellular distribution. We have observed a similar distribution over the course of the day for a known core clock protein, PERIOD1, suggesting an interaction between PERIOD1 and PLC- $\beta$ 4. This data and our continuing research will enable us to more fully understand the complex signaling mechanisms in this tissue. By learning more about this pathway in the liver, we hope to move closer to revealing the molecular basis for the body's most central and important processes. This research was supported by the College of Charleston's 4th Century Initiative Undergraduate Research and Creative Activities Program and by NIH Grant Number P20 RR-016461 from the National Center for Research Resources NIH SC-INBRE grant.



GALECTIN-3 IS DIFFERENTIALLY MODULATED BY 17BETA-ESTRADIOL AND  
TAMOXIFEN IN HUMAN BREAST CANCER MCF-7 CELLS

**Bolanle Balogun**, Leeann Nelson, John Rollinson, Samir Raychoudhury,  
and Holly LaVoie<sup>1</sup>

Dept. of Biology, Chemistry and Environmental Health Science, Benedict College

<sup>1</sup>Dept. of Cell and Developmental Biology and Anatomy, USC School of Medicine

Galectin-3 is a member of a family of beta-galactoside binding proteins that play key roles in a variety of biological processes including inflammation, cell proliferation, cellular differentiation, and cell-cell adhesion. In this study we have examined the effects of 17beta-estradiol ( $E_2$ ) and tamoxifen (TAM) on estrogen responsive human breast cancer MCF-7 cells. Estrogens are hormones that function as signaling molecules and act on target tissues by binding to estrogen receptors (ER). Tamoxifen (TAM) can act as a weak estrogen agonist or act as an estrogen antagonist and blocks ER-mediated breast cancer cell proliferation. We have analyzed galectin-3 protein expression in MCF-7 cells following treatment with  $E_2$   $10^{-6}$  M,  $E_2$   $10^{-8}$  M, TAM  $10^{-6}$  M, TAM  $10^{-8}$  M for 24, 48 and 72-hours and compared to 0.1% BSA and 0.1% DMSO containing media as control groups. Protein from cell extracts was prepared with a detergent buffer and a cocktail of protease inhibitors and protein content was determined by BCA assay. Proteins were separated by SDS-PAGE and immunodetection of proteins was carried out by western blot analysis using rabbit polyclonal galectin-3 primary antibody followed by incubation with HRP-conjugated secondary antibody. After chemiluminescence detection and visualization on X-Ray film, we performed scanning and densitometric analysis. There was no relative change in galectin-3 localization in the 24-hour treatment group. However, both 48 and 72-hour treatment with TAM  $10^{-6}$  M significantly decreased relative expression of galectin-3 in MCF-7 cells. The downregulation of galectin-3 by tamoxifen was associated with growth suppression in MCF-7 cells. The results suggest that galectin-3 expression is necessary for the maintenance of the transformed and tumorigenic phenotype of MCF-7 breast carcinoma cells. \* Supported by grants from NIH P20 MD00233 and HD38342, and INBRE Award P20 RR16461 (EPSCoR/CRP)

DOES HOMER2 PROTEIN REGULATE LIGHT INPUT IN THE MAMMALIAN  
CIRCADIAN TIMING SYSTEM?

**Barbra Bannan**, Elizabeth Meyer-Bernstein, and Pamela Riggs-Gelasco<sup>1</sup>  
Dept. of Biology, <sup>1</sup>Dept. of Chemistry/Biochemistry, College of Charleston

Homer is a family (Homer1, Homer2, Homer3) of scaffolding proteins as well as an immediate early gene that is primarily located at excitatory synapses within the central nervous system. Homer selectively binds group I metabotropic glutamate receptors (mGluR1) and links mGluR1 with inositol triphosphate receptors embedded in the endoplasmic reticulum membrane. This ultimately modulates the release of intracellular calcium stores.

We hypothesize that Homer plays a significant role in the molecular pathway associated with biological rhythms, specifically, the ability of light to reset the clock. When light enters the retinohypothalamic tract, it stimulates the release of the neurotransmitter glutamate, which binds to the mGluR1s, eventually causing an increase in intracellular calcium. An increase in calcium is correlated by the ability of light to reset the internal clock. Thus, we predict that Homer proteins are an essential link between mGluR1 binding and clock resetting.

In our experiment, we are comparing the effect of photic stimuli on the circadian clock in homozygous wild type versus homozygous homer 2 knockout mice. We will be monitoring the wheel running behavior in these mice under various ambient lighting conditions

during which we can behaviorally assess the output of their endogenous biological clock. It is anticipated that the mice lacking the *homer 2* gene will display an aberrant circadian phenotype as compared to homozygous wild type.

These data are likely to provide insight into the signaling pathway by which photic stimuli reset the biological clock. This has implications for therapeutic use of light in depressive illnesses and aging as well as moderating the negative effects of jet-lag and shift work. This research was supported by the College of Charleston's 4th Century Initiative Undergraduate Research and Creative Activities Program and by NIH Grant Number P20 RR-016461 from the National Center for Research Resources NIH SC-INBRE grant.

#### EFFECT OF THAW TEMPERATURE ON MURINE BLASTOCYST DEVELOPMENT

**Heather M. Barton**, H. Lee Higdon III<sup>1</sup>, Jennifer E. Graves-Herring<sup>1</sup>,  
and William R. Boone<sup>1</sup>

Dept. of Animal and Veterinary Sciences, Clemson University

<sup>1</sup>Dept. of Obstetrics and Gynecology, Div. of Reproductive Endocrinology and  
Infertility, Greenville Hospital System University Medical Center

Assisted Reproductive Technology (ART) methods are employed to assist infertile couples to conceive. During an ART cycle, supernumerary embryos are generally produced and cryopreserved for future use. However, embryos frozen and thawed have reduced rates of blastocyst development and thus a reduced chance to conceive. Thawing temperature is one of the factors thought to affect embryo development after cryopreservation. The objective of this study was to determine if varying thaw temperatures would affect embryo development. Using a randomized, controlled study, approximately 230 two-cell, murine embryos were exposed to cryoprotectants and frozen in lots of 15 embryos per straw. Cryopreserved embryos were thawed in water baths set at 30°C (N = eight straws) and 37°C (N = eight straws). Upon removal of the cryoprotectants, the embryos were incubated for 72 hours and assessed for blastocyst development using Chi square test. Blastocyst development for straws thawed at 30°C was 52.1% (63/121), compared to 45.5% (50/110) for straws thawed at 37°C (P = 0.4). In conclusion, the thaw temperatures selected for this study had no effect on the post-thaw development of embryos. Future studies should assess other aspects of the thawing procedure, including length of time straws are submerged in the water bath, as well as the effect of pre-thawing straws at room temperature before exposed to a water bath.

#### A SYSTEMATIC EVALUATION OF HPV VACCINE EDUCATIONAL MATERIALS

**Beverlee Blanchard**, Heather M. Brandt<sup>1</sup>, and James R. Hebert<sup>1</sup>

Clafin University

<sup>1</sup>USC Columbia, Cancer Prevention & Control Program

Human Papilloma Virus (HPV) knowledge among the general population remain low. The emergence of and approval of a preventive HPV vaccine raises questions of success in terms of the ability of the vaccine to be delivered as recommended due to issues of limited knowledge and understanding of HPV, its link to cervical cancer and vaccine acceptability. The purpose of this evaluation was to assess the suitability of current educational HPV vaccine materials targeted at the patient. Fifteen educational materials were identified using a systematic web-based search of government, public health and related sites. The materials were assessed for reading grade level using the SMOG method and Fry method. The materials were assessed for suitability using the Suitability Assessment of Materials (SAM) tool; having such criteria as "Layout and Typography", "Learning Stimulation, Motivation", and "Cultural Appropriateness". HPV

vaccine content was evaluated based upon a researcher- developed 17 point HPV vaccine content assessment that included such criteria as “How the vaccine works”, “How is the vaccine administered” and “Effectiveness of the vaccine”. Results of this evaluation showed that no material had an acceptable reading grade level (all>10th) and SAM tool rating (all<66%). The average reading grade level of all fifteen materials scored at approximately grade level 14 (range: 10-17); which is considered college level or beyond. Of all fifteen materials, no material scored as “Superior”; all materials scored as “Adequate” (range: 41-65%). Each material lacked considerably in HPV vaccine content. Most topics included in the content assessment were covered minimally or not at all. Only four materials covered more than half of the content criterions. Based on this evaluation, HPV vaccine educational materials must be revised and/ or developed to include more vaccine content, be written at lower reading grade levels and address suitability. It is also recommended that these and future materials target a more specific audience and be written according to the specifications of that group.

#### SLOWLY PULSATING B STARS: APT VERSUS MERCATOR RESULTS

**Joseph L. Bramlett III** and Robert J. Dukes, Jr.  
Dept. of Physics and Astronomy, College of Charleston

We report the analysis of the slowly pulsating B stars HD1976, HD25558, HD199122, HD222555, and one suspected one, HD44112. These stars have been observed since late 1999 by the Four College Consortium Automatic Photoelectric Telescope (FCAPT). After reducing the data using standard APT techniques we have analyzed it for periodicity using several different period determination programs including Period04 and a version of the CLEAN algorithm. We have confirmed 5 distinct periods for HD1976, 2 periods for HD25558, 3 periods for HD44112 and one possible candidate, 3 periods for HD199122 and 3 candidates, and 5 periods for HD222555, with 4 candidates. The signal-to-noise ratio as defined by Period04 for these frequencies is significantly higher than the value of 4 which is generally accepted as indicating an actual period.

Three of these stars have also been observed by the Belgium group using Geneva photometry with the Mercator telescope located in the Canary Islands. We compare our results with theirs and find agreement for two of the three stars in common. This work has been supported by a College of Charleston Major Academic Year Support Grant and NSF Grants AST95-28906 and AST05-07551.

#### *OITHONA COLCARVA*, A COPEPOD SPECIES PUTATIVE INTERMEDIATE HOST FOR THE PHILOMETRIDS *PHILOMETRA OVERSTREETI* AND *PHILOMETROIDES PARALICHTHYDIS*

**Timothy Bryan** and Isaure de Buron  
Dept. of Biology, College of Charleston

*Philometra overstreeti* and *Philometroides paralichthydis* are philometrids commonly found infecting the buccal cavity of southern flounder, *Paralichthys lethostigma*, in the South Carolina estuarine system. Gravid females of *P. overstreeti* are located among the teeth on the upper and lower jaw, whereas gravid females of *P. paralichthydis* are associated with various bones of the buccal cavity. Copepods belonging to five species common to the Charleston Harbor, *Acartia tonsa*, *Parvocalanus crassirostris*, *Saphirella tropica*, *Temora turbinata*, and *Oithona colcarva*, were collected and exposed to first stage larvae of both species of philometrid. *O. colcarva* was the only copepod species that successfully allowed the development of larvae of both *P. overstreeti* and *P. paralichthydis* in the hemocoel. For both species of philometrids, the first molt, from L1 to L2, was observed as early as 24 hours post exposure. Indications of a second molt from L2 to L3

occurring 5 days post exposure were noted but were not conspicuous and needed better resolution microscopy. A study verifying second molting using semi-thin serial sections of infected copepods as well as transmission electron microscopy was initiated and results will be presented. \* Funded in part by a Summer Undergraduate Research with Faculty grant from the College of Charleston.

#### INTERVENTIONS FOR IMPROVING THE HEALTH OF HIV INFECTED PERSONS

**Robert Bryant**, Lateisha Tiller, Vernesha Brooks and Gregory Hand<sup>1</sup>  
Claflin University  
<sup>1</sup>USC Columbia

Study one: Studied the overall quality of life and stress levels in HIV infected subjects who agreed to take acupuncture. Subjects were African-Americans and in underserved communities. Subjects were required to come to clinic for acupuncture twice a week for 10 weeks and evaluated for stress levels at the beginning, middle, and end of the research. Through questionnaires and analysis of salivary cortisol, stress levels were determined through graphs and charts from excel. In the study of acupuncture the overall stress and salivary cortisol levels were expected to be lowered, but the results are inconclusive as of yet.

Study two: Studied the overall gain of lean tissue mass while maintaining body mass in HIV subjects who agreed to take low and moderate intensity exercises twice a week for six weeks. The exercise combined aerobic training and moderate resistance training. Observations in stress levels were made through questionnaires, DEXA scans, observance of salivary and urinal cortisol and testosterone levels in subjects. The results of the research are inconclusive as of yet.

#### TISSUE PHANTOM FOR PHOTOSENSITIZER QUANTIFICATION

**Jane Buchanan**, Eric Johnstone, Melinda Lee, Daryl Reynolds, Linda Jones  
and Norris Preyer  
Dept. of Physics and Astronomy, College of Charleston

Photodynamic therapy is a cancer treatment that involves the combined action of a photosensitizing dye, red light and molecular oxygen. The sensitizer localizes in cancer tissue following intravenous administration. Red light is absorbed by the sensitizer and the light energy is transferred to molecular oxygen. The resultant singlet oxygen destroys biological molecules in the immediate region. A threshold amount of light absorption is necessary for an irreversible therapeutic result. Accurate knowledge of the sensitizer concentration is necessary for determination of the optimal light dose. This project involves a tissue phantom that is used for photosensitizer quantification. The phantom is composed of bovine blood, intralipid and saline. Sensitizer fluorescence emission is determined for known quantities of porfimer sodium at 403 nm excitation and 627 nm emission. Phantom preparation and fluorescence results will be presented.

#### SYNTHESIS OF A COMMON INTERMEDIATE TO DEVELOP ANALOGS OF THE ANTIBIOTIC CYTOSPORONE E

Megan A. Callanan, **Elizabeth H. Flynn**, and Justin K. Wyatt  
Dept. of Chemistry and Biochemistry, College of Charleston

The antibiotic cytosporone E was isolated in 2000 and found to have weak antibiotic activity, and has recently been found to have only activity against gram-positive bacteria. The apparent business end of the phthalide contains three phenolic moieties, where the central moiety is need for antibiotic activity. What is the role of the central hydroxy

group? To help determine this role it will be replaced with a vinyl group to generate a "common intermediate" that will be used to synthesize a number of other analogs of the parent compound. These analogs will be apart of a SAR study to improve the antibiosis of the antibiotic. \*Supported by NIH SC-INBRE Grant # P20 RR-016461

ANALYZING *ENTAMOEBEA HISTOLYTICA* CYTOPATHIC DESTRUCTION IN  
RESPONSE TO LIPOPROTEIN-CHOLESTEROL.

**April Clayton** and Lesly Temesvari

Dept. of Biological Sciences, Clemson University

*Entamoeba histolytica* is the protozoan eukaryotic parasite that causes amoebic dysentery and amoebic liver abscess in humans. The organism infects ten percent of the world's population, leads to about fifty million cases, and causes ultimately 100,000 deaths a year. *E. histolytica* trophozoites colonize and adhere to the epithelial and mucus layers of the human host, and such encounters with the host induce cellular events in *E. histolytica* that influence the parasite's virulence. Thus, it is vital to understand the molecular mechanisms of *E. histolytica*-host interactions. It has been shown through previous research by Laughlin et al. that *E. histolytica* possess lipid raft-like domains in its plasma membrane that may be important to virulence. Found in most eukaryotes, lipid rafts are cholesterol enriched regions of the cell's plasma membrane that play a role in cellular events such as endocytosis, adhesion, and secretion. Lipoprotein, a source of cholesterol, was therefore used to determine if *E. histolytica* cytopathy of host cell monolayers could be enhanced in the presence of extracellular cholesterol. Chinese Hamster Ovary (CHO) cells, a model line of epithelial cells, were used as host cell monolayers in cell killing assays. *E. histolytica* cells were treated with high (101 mg/dl to 300 mg/dl) and low (15 mg/dl to 77 mg/dl) concentrations of lipoprotein and then placed on the host monolayers, which had been stained with the fluorescent dye, calcein AM. Host monolayer destruction was then quantified by spectrofluorimetry. Host monolayer destruction was altered by treatment of *E. histolytica* cells with lipoprotein, and an optimal concentration of lipoprotein was required for enhanced adhesion.

INCREASING THE BASIC CHARACTER OF THE ANTIBIOTIC CYTOSPORONE E

**Stefan M. Cooper Jr.**, and Justin K. Wyatt

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The antibiotic cytosporone E was isolated in 2000 and found to have weak antibiotic activity, and has recently been found to have only activity against gram-positive bacteria. The apparent business end of the small phthalide contains three phenolic moieties, where the central moiety is need for antibiotic activity. The importance of the central hydroxy group is not understood and so it will be replaced with an amino moiety to help determine some of the characteristics of the binding site for this antibiotic. \*Supported by NIH SC-INBRE Grant # P20 RR-016461

MICROBIAL CONTAMINATION AND BIOLOGICAL ACTIVITIES OF CAT'S CLAW  
AND BLUE COHOSH HERBAL PRODUCTS

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*Uncaria tormentosa*, cat's claw, has been used for its adaptogenic, anti-microbial, antioxidant, anti-viral, anti-inflammatory and anti-tumor properties. Research has shown that it contains alkaloids that enhance phagocytosis and rhynchophylline which inhibit

platelet aggregation and thrombosis. *Caulophyllum thalictroides* (L.) Michx., blue cohosh, has been used alone and in combinations with other herbs, such as black cohosh, to regulate the menstrual cycle and ease cramps. It has also been used to treat endometriosis and as a uterine tonic. It contains oxytocin and has also been used to start labor. Upon obtaining two herbal products for each of these herbs, each product was checked for contamination using Nash-Snyder, MacConkey, and tryptic soy broth agar (TSBA) media. The colonies were then identified using fatty acid analysis. The first cat's claw sample, a loose material, contained  $1 \times 10^4$  bacteria per gram of sample. The product contained bacteria from the *Cellulomonas*, *Brevibacillus* and *Bacillus* genera. Out of these three genera, the *Bacillus subtilis*, *Brevibacillus centrosporus*, and *Bacillus cereus* species were identified. The second cat's claw product, a tablet, produced no contaminants. The first blue cohosh product, a loose material, produced  $6.66 \times 10^2$  bacteria per gram of material. The product contained bacteria from the *Bacillus* and *Actinomadura* genera. *Bacillus subtilis* was identified. The second blue cohosh product, a tincture, contained 66 bacteria per gram. *Bacillus* and *Paenibacillus* were the only genera represented in the product. *Paenibacillus polymyxa*, *Paenibacillus gordonae*, and *Bacillus pumilus* were identified. Fungal colonies were found on plates but have not been identified. Most of the species identified were soil organisms that are not generally harmful to humans except immunocompromised individuals. Further research will be done on the bacteria identified and the biological activities of each plant product.

#### ADSORPTION OF THE COLIPHAGE T4 TO CLAY MICELLS

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It has been determined that bacteria are adsorbed by clay micelles (Franco, 2006; Marshall, 1971). This results in the bacteria being carried from land into aquatic systems and the subsequent distribution of those organisms through out the aquatic system. In this study we determined that the coliphage T4 which invades the enteric bacteria *Escherichia coli* is also adsorbed by the clay micelles. We suggest that this will provide the phage an opportunity to invade and lyse the bacteria. This would lead to a reduction of the bacteria in the water column.

#### ANALYSIS OF SOUTH CAROLINA CENTRAL CANCER REGISTRY BREAST CANCER DATA: UNDERSTANDING RACIAL DISPARITIES

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Patterns of adverse characteristics in breast cancer in African American (AA) women versus European American (EA) women are major health disparities. In a recent study using tumor registry data from hospitals in the Columbia area, even small breast cancers, breast cancers diagnosed early, have been shown to have more unfavorable characteristics in AA women than EA women. This study analyzed characteristics of breast cancers at diagnosis to verify (a) whether patterns of breast cancer characteristics differed between the two major racial groups of women in South Carolina, and (b) whether these observed patterns varied with the source of data. Data were obtained from SC Dept. of Health and Environmental Control (DHEC), who receive their data from all hospitals in SC. This data is from the SC Central Cancer Registry. These are either American College of Surgeons (ACOS) accredited facilities or not accredited. The data included 21,646 black and white cases of female breast cancer from the 46 counties within South Carolina, and diagnosed between the years 1996 through 2002. In the dataset, 78% of the women were

EA women and 22% were AA women. Between both racial groups total, 67% of data were from ACOS facilities and 33% from non-ACOS facilities. More AA women had distant metastasis than did EA women (6% versus 3%  $p = 0.001$ ). In both patient groups 84% had invasive cancers. AA women had higher grade cancers, ER/PR negative tumors, and larger sized tumors. AA women tend to have breast cancers with trademarks of more unfavorable characteristics, even when diagnosed early. These patterns show that breast cancer is different between AA women and EA women.

#### DEVELOPMENT OF ANALYSIS FOR MERCURY IN BIRD FEATHERS USING OCEAN OPTICS USB2000 SPECTROMETER

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Mercury is known to accumulate in feathers and hair, which provide measurements of mercury levels that are used as indicators of environmental mercury exposure. Mercury in high concentrations causes neurological damage. In response to an inquiry from a biologist, mercury analysis protocol was tested. Several different sample treatments were suggested in the literature. Dissolution of feathers in concentrated nitric acid and reduction with tin (II) chloride resulted in a suppressed mercury response. Further oxidation with potassium permanganate resulted in an acceptable recovery of mercury in the feather standards. Measurements of mercury vapor absorption at 254 nm were made using a mercury line source, 12 cm quartz cell, and an Ocean Optics USB2000 spectrometer. Results for feather samples collected near a mercury contaminated site are discussed.

#### HEMOCYTE ACTIVATION IN FLIGHT MUSCLE HISTOLYSIS

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and Dept. of Biology, USC Columbia

The focus of this research effort is the cell-mediated immune response observed during juvenile hormone (JH) induced flight muscle histolysis in the house cricket, *Acheta domesticus*. Histolysis results in degeneration of the flight musculature and accounts for loss of flight in winged adult crickets. Previous studies suggest that flight muscle histolysis in the house cricket is an example of an active, developmentally regulated cell death program induced by an endocrine signal. The experimental objectives were to analyze the level of immune response through assay of hemocyte activity. Assays of hemocyte loads and encapsulation rates were performed on crickets treated to induce or inhibit histolysis. Both hemocyte loads and encapsulation rates varied throughout the course of histolysis. Further studies are necessary to determine the extent to which these variations are involved in immune response in histolysis. This research was supported by SC-Life, SC-INBRE-NSF/EPSCOR and NIH-RIMI (MD 00233).

#### CHARACTERIZATION AND PARTIAL PURIFICATION OF ACID PHOSPHATASE ACTIVITY IN FLIGHT MUSCLE HISTOLYSIS

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Acid phosphatase (AcP) activity is elevated during the rapid phase of muscle degeneration that occurs at age Day 3 in house crickets undergoing flight muscle histolysis. We have characterized the AcP activity by analysis of enzyme kinetics and inhibition patterns.

AcP activity during histolysis is inhibited by tartrate, but the inhibition profile is altered during the course of histolysis. Partial purification of AcP using column and SDS-PAGE chromatography suggest the activity may be associated with protein(s) migrating at approximately 70kD. Further efforts are needed to resolve the specific proteins responsible for AcP activity in flight muscle histolysis. This research was supported by SC-Life, SC-INBRE-NSF/EPSCOR and NIH-RIMI (MD 00233).

**STRONG BASE SYNTHESIS OF PYRAZOLYL-ORTHO-BENZENESULFONAMIDES  
WITH C(ALPHA),N-HYDRAZONES AND  
METHYL 2-(AMINOSULFONYL)BENZOATE**

**Anna C. Dawsey**, Luan Q. Do, John D. Knight, Clyde R. Metz, Charles F. Beam,  
William T. Pennington<sup>1</sup>, Donald G. VanDerveer<sup>1</sup> and N. Dwight Camper<sup>2</sup>  
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Three N-substituted types of pyrazolyl-ortho-benzenesulfonamides have been prepared from methyl 2-(aminosulfonyl)benzoate, and several hydrazones employing strong base multiple anion synthesis methods. All of the pyrazoles are new because it would be difficult or even impossible to make them by traditional methods, and they have considerable potential for biological activity in agriculture

The hydrazones were prepared by a 1:1 condensation of a C(alpha)-carbonyl compound and either phenylhydrazone, or methyl, ethyl, or tert-butyl carbazates. In separate studies phenylhydrazones, or carboalkoxyhydrazones (methyl or ethyl or tert-butyl), were dilithiated with excess lithium diisopropylamide (LDA), and each of the 1,4-dilithiated intermediates that resulted were condensed with methyl 2-(aminosulfonyl)benzoate. The analogous C-acylated intermediates that resulted were not isolated but cyclized immediately. At this point the N-phenyl-, N-carboethoxy- and N-carbomethoxy- pyrazolyl-ortho-benzenesulfonamides were isolated and characterized. The N-carbo-tert-butoxypyrazoles were treated at room temperature for at least 12 hours with 6 M hydrochloric acid. This results in the cleavage of the tert-butyl ester giving the N-carboxylic acid pyrazole, which decarboxylates to the N-H pyrazole.

In addition to regular characterization, a representative N-phenylpyrazolyl-ortho-benzenesulfonamide gave excellent X-ray crystal analysts results. Three other pyrazoles in this series gave outstanding bioassays working with agrobacterium tumafaciens in tumor inhibition studies. The remaining pyrazoles are candidates for biological testing, and all 5-substituted pyrazolyl-ortho-benzenesulfonamides are undergoing additional synthetic development

**STRONG BASE SYNTHESIS OF AROYLACETONES,  
PHENACYLTHIOCHROMONE, PHENACYLQUINOLINONES AND RELATED  
COMPOUNDS**

**Luan Q. Do**, Anna C. Dawsey, John D. Knight, and Charles F. Beam  
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Three updated synthetic approaches have been undertaken for the rapid synthesis of multi gram quantities of substituted 1-aroylacetones, none of them being commercially available, and not easily prepared by traditional methods. These beta-diketones are being used in the strong base multiple anion synthesis of 2-phenacylthiochromones, 1-methyl-2-phenacylquinolin-4-ones and related heterocyclic compounds. Aroylacetones are being prepared by the condensation of monolithiated acetone with substituted benzoate esters, the condensation of dilithiated ethyl acetoacetate with benzoate esters



followed by hydrolysis and decarboxylation, and by the possible condensation of lithiated ethyl acetate and substituted acetophenones and related ketones. Additional preliminary results indicate the feasibility of condensation of dilithiated aroylacetonones with lithiated methyl thiosalicylate or with N-methylisatoic anhydride. The resulting intermediates from each of these separate condensations can be acid cyclized to either 2-phenacylthiochromones or 1-methyl-2-phenacylquinolin-4-ones, respectively. All of the compounds will be characterized by contemporary methods not available at the time that some of the syntheses of the products were reported. Usually, all of the heterocyclic compounds are new, and they would be difficult or impossible to prepare by traditional methods. Some of the 1-aroylacetonones are new, and they can be prepared in 5-15 gram quantities, and they can be purified recrystallization from routine solvents. All of the prepared and targeted products have considerable synthetic and biological potential.

#### A STELLA II MODEL OF THERMOHALINE OCEAN CIRCULATION

**Claire duPont** and Laney Mills

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A major factor in the earth's climate is a low steady movement of the world's oceans. This so-called thermohaline circulation is driven by colder, more salty, denser water sinking in the polar regions and rising of warming water in the tropics. This talk will present a simplified simulation of this motion using the Stella II modeling program which is widely used for desktop climate modeling. Even the very basic physics of the interplay between density distribution and mass distribution is surprisingly subtle. For example, the decision has to be made whether to describe the density and temperature of water at each of several predetermined fixed cells along the path (Eulerian approach) or rather to follow along the changes in the physics parameters of each identified mass of water as it flows (Lagrangian description). The problem is complicated by the fact that the physical parameter changes and the flows depend each on each other.

#### COMPARISON OF *PEROMYSCUS* EEFA1 ELONGATION FACTOR EST WITH OTHER VERTEBRATES

**Okon Emole** and Jianguo Chen

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The *Peromyscus* (Deer mice) are the most common native North American mammals. They differ from *Mus domesticus* and *Rattus norvegicus*. *Peromyscus* are the primary reservoirs of microbes that cause Lyme disease and Hantaviral pulmonary syndrome. The *Peromyscus* Expressed sequence tags (EST) sequences have been analyzed with the known mammalian EST and it was found that EEFA1 elongation factor from *Peromyscus* demonstrated novel alternative splicing forms (1). Alternative splicing is the process that occurs in eukaryotes in which the splicing process of a pre-mRNA transcribed from one gene can lead to different mature mRNA molecules and therefore to different proteins. This project, compared the 786 nucleotides long *Peromyscus* EEFA1 EST sequence with each individual EST from Mouse, Rat, Chicken, Human, Dog, and chimp. It was found that 601 *Peromyscus* nucleotides sequence match Mouse EST, 619 to Human EST, 579 to rat EST, 557 to dog EST, and 553 to chimp EST, 98 to chicken EST.

COMPARISON OF SOURCES OF FINE PARTICULATE MATTER AT COASTAL  
CAROLINA UNIVERSITY

**Kimberly Englehart** and Darlene L. Slusher  
Coastal Carolina University

We are routinely sampling atmospheric particles on campus in an effort to gauge the relative influence of local traffic versus a nearby power plant. Our focus is on fine particulate matter because it is a more serious health hazard than coarse particulate matter. The samples are collected over a 24 hr period and analyzed by ion chromatography for nitrate and sulfate concentrations. Automobiles are a significant source of reactive oxides of nitrogen which form nitrate in aerosols. The coal-fired power plant is the biggest local source of sulfur dioxide which forms sulfate in aerosols. We will present an analysis of nitrate to sulfate ratios over time with different traffic conditions (including before, during, and after spring break) and prevailing wind directions.

A PRELIMINARY STUDY OF THE ARKWRIGHT DUMP SITE/FOREST PARK  
NEIGHBORHOODS USING SMALL MAMMALS AS BIOINDICATORS

**Rene' M. Eslick**, Jason J. Schumm, Andrew M. Davis<sup>1</sup>, Meri Gerges, Dereck Adams,  
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There are six environmental target areas within the Arkwright Dump Site/Forest Park Neighborhoods located in Spartanburg, SC consisting of abandoned fertilizer and textile plants, dumpsites and currently operating chemical plant and textile mill. In previous investigations of the Arkwright Dump Site conducted by the EPA (1998, 1999), the presence of hazardous materials including heavy metals and pesticides were detected in soil samples and ground water. As part of an overall cleanup/redevelopment project, Spartanburg County was selected to receive a Superfund Reuse/Redevelopment Pilot Project Grant and was subsequently awarded a Brownfield Pilot Grant. As a subproject sponsored by the Community Outreach Partnership Center for Housing and Urban Development, our research focuses on the lingering environmental impacts on local residents of the surrounding areas using small mammals as bioindicators. In the summer of 2006, we collected 109 small mammals specimens. Specimens were processed for macrodevelopmental and morphological abnormalities and samples of hair, teeth, liver and kidneys were taken. The preliminary results from the gross anatomical portion of our study were documented and will be presented. Funded through the Housing and Urban Development Community Outreach Partnership Center Grant.

DEVELOPMENT OF A LUCIFERASE ASSAY FOR ANALYSIS OF ANTI-HIV  
RIBOZYME ACTIVITY IN TISSUE CULTURE

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The Acquired Immune Deficiency Syndrome (AIDS) is due to the progressive loss of an important population of immune cells – CD4+ TH lymphocytes. The loss of these cells is due to the infectious process of the causative agent, the Human Immunodeficiency Virus (HIV). Our interest is in the use of anti-viral ribozymes targeted to specific HIV mRNAs as a means to inhibit viral replication. Specifically, the goals of this work were to develop a luciferase assay to assess anti-ribozyme activity in a tissue culture system and to generate a retroviral vector to express an anti-HIV hammerhead ribozyme for testing in this system. This assay is based on the use of a replication-incompetent HIV genomic

clone, pNL43.Luc.R-E-, which expresses the luciferase gene from the viral promoter. This plasmid, when transfected into packaging cells, produces non-infectious virus particles that can be used to transduce target cells. Such cells provide a model system for HIV gene expression and allow luciferase assays to be used to monitor the level of gene expression in transduced cells. The second requirement for this system was to develop a means to express anti-HIV ribozymes in target cells. The ribozyme chosen for initial testing was Tat5910, which has been shown to efficiently cleave HIV-1 tat RNA in *in vitro* cleavage assays. Tat is a regulatory gene in the HIV genome that is responsible for increased processivity of RNA polymerase II and therefore upregulates viral transcription from the HIV promoter. Tat5910 was cloned into the self inactivating retrovirus, pSuper.retro.neo+GFP (pSRNG), a vector designed to express siRNAs from the RNA Pol III H1 promoter. The presence of the ribozyme was verified by direct sequencing. This vector, pSRNGTat5910, expresses GFP from the strong PGK promoter which allows transfected cells to be easily identified. Current analyses are underway to characterize ribozyme expression in HeLa cells.

#### SYNTHESIS OF ALKYNLATED AMINO ACIDS FOR USE IN 1,3-DIPOLAR CYCLOADDITION REACTIONS

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1,3-Dipolar cycloaddition reactions offer a new means of sensitive *in vivo* fluorescent biological detection. The terminal alkyne and azide reactants in cycloaddition reactions can be chosen for favorable intermolecular interactions with biological systems. We have synthesized a series of amino acid propargyl esters that are capable of undergoing cycloaddition and protein binding. We will discuss the synthetic methodology, characterization, and application of these compounds for fluorescent imaging. This work is supported by NSF grant no. EPS-4007660

#### DESIGN AND CLONING A HAMMERHEAD RIBOZYME TARGETED TO VPU6077

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The Human Immunodeficiency Virus type 1 (HIV) encodes six accessory proteins, one of which is Viral protein U (Vpu). Vpu is an integral membrane phosphoprotein that is an important factor in viral pathogenesis and serves two main functions in HIV infected cells. Vpu induces rapid degradation of the CD4 receptor in the endoplasmic reticulum and enhances viral particle release. Due to the crucial role of Vpu in HIV replication, it may prove to be a good target for anti viral reagents. Hammerhead Ribozymes are catalytic RNAs that cleave specific mRNA substrates in a complementary manner. The HIV NL43 genomic sequence (Accession #M19921) was analyzed for the presence of suitable ribozyme cleavage sites. One such site, a GUA located at nucleotide 6077, which was predicted to form part of a loop structure within the Vpu mRNA, was selected for targeting using a hammerhead ribozyme. Based on the location of the GUA site, a hammerhead ribozyme was designed using the model proposed by Haseloff and Gerlach. The ribozyme sequence was synthesized as DNA and cloned in pPCR-Script. One positive clone, pVpu6077, was verified by sequencing.

INVOLVEMENT OF UBIQUITIN-MEDIATED PROTEOLYSIS IN  
FLIGHT MUSCLE HISTOLYSIS.

**Maritza Gil**, Irine Chepkoech, Acchia Albury and Rush Oliver  
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Flight muscle histolysis in the house cricket is an example of developmentally regulated programmed cell death. We have investigated possible involvement of the ubiquitin-mediated proteolytic system in the mechanism of flight muscle histolysis. Levels of low-mobility anti-ubiquitin immunoreactive proteins revealed by Western-blot analysis are increased during the early stages of muscle degeneration. Cervical ligation to eliminate juvenile hormone signals that initiate histolysis and cycloheximide treatments that block de novo protein synthesis reduce accumulation of anti-ubiquitin immunoreactive proteins. Treatments with MG 132, a proteasome inhibitor, result in maintenance of muscle shortening but fail to block loss of protein in flight muscles. These results suggest the ubiquitin-mediated proteolytic system is involved in flight muscle histolysis. This research was supported by SC-Life, SC-INBRE-NSF/EPSCOR and NIH-RIMI (MD 00233).

EFFECT OF PLASMID DNA SHAPE ON BINDING TO PROTEIN-SIZED METAL  
NANOPARTICLES

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Plasmids are small rings of duplex DNA found in the cytoplasm of bacteria that are capable of replicating on their own. Plasmid DNA can be cut and modified by inserting DNA from another source into the plasmid without inhibiting its ability to carry out its function or replicate. In general, plasmids exist in a supercoiled form, which can be thought of as a twisted, closed circle. However, certain enzymes can react with the plasmid to produce a relaxed (circular) form while other enzymes can completely cut the plasmid generating a linear form. We have examined the role plasmid DNA topology plays in its binding with metal nanoparticles. The binding of supercoiled and relaxed pUC2.1 plasmid DNA to silver and gold nanoparticle substrates was analyzed using surface-enhanced Raman spectroscopy (SERS) and UV-vis spectroscopy. SERS titration experiments were performed using three different samples: relaxed, half relaxed/half supercoiled, and supercoiled plasmid in a mixture of silver and gold nanoparticles. The intensity of the adenine ring breathing signal is proportional to the concentration of the absorbed plasmid. Both the SERS data and UV-vis data indicate definite differences in the binding properties of the topologically different plasmid DNA to silver and gold nanoparticles. Understanding the interaction between plasmid DNA and nanoparticles may provide insight in future genetic engineering and gene therapy techniques. \*Supported by NSF EPSCoR.

FURTHER DEVELOPMENT OF A NOVEL APPROACH TO CONTROLLING THE  
DIASTEREOSELECTIVITY OF THE MEYERS ORTHO-ALKYLATION OF CHIRAL  
AROMATIC OXAZOLINES

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The Meyers ortho-alkylation of aromatic oxazolines has been known for many years, yet there has only been one example of this powerful methodology being applied to alkylation of chiral aromatic oxazolines to control the diastereoselectivity of the alkylation. The original example approaches the reaction utilizing the concept of a dangling-donor to control the stereochemistry. However, this falls short of its goal and so further work is

needed. The new chiral aromatic oxazolines that have been designed and the progress towards their synthesis are presented. \*Supported by NIH SC-INBRE Grant # P20 RR-016461 and Research Corporation Grant # CC5877

TOWARDS AN OVEREXPRESSION SYSTEM FOR THE ENZYME MANGANESE  
CATALASE FROM *LACTOBACILLUS PLANTARUM*

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The enzyme catalase detoxifies hydrogen peroxide by converting it to water and molecular oxygen. This reaction is one of the cell's main defenses against oxidative damage. In most organisms, the reaction is catalyzed in a heme protein at an iron active site. As the genomes of more microorganisms are published, however, it is clear that some bacteria utilize a dinuclear manganese enzyme to catalyze this critical reaction. Manganese catalase genes in two human pathogens, *Bacillus anthracis* (the causative agent of anthrax) and *Bacillus cereus* (common causative agent in infections) have recently been reported. Given the central role of catalase in protecting a cell from oxidative damage, and given that major human pathogens utilize a markedly different enzyme for this vital function, it follows that an effective drug could be designed to specifically target the manganese catalase of these bacterial species. These recent literature reports happen to coincide with our interest in the Mn catalase from *Lactobacillus plantarum* as a model for a manganese dependent ribonucleotide reductase, itself a target for anticancer, antiviral and antibacterial drugs. Our goal is to develop an overexpression system and purification for the manganese catalase from *L. plantarum* for three reasons: 1) to serve as a spectroscopic and electronic model for the manganese ribonucleotide reductase, 2) to be the basis for a sequence of upper level biochemistry labs for Chemistry 354 (the capstone academic laboratory course for biochemistry majors), and 3) to provide insight into the subtle mechanistic details of manganese catalases in general. Our progress towards these goals will be described.

TRANS-ATLANTIC MOVEMENT AND INTRODUCTION OF BACTERIA FROM  
AFRICA INTO ESTABLISHED CARIBBEAN ECOSYSTEMS

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Ecosystems are a result of a delicate balance of organisms surviving and interacting within the same vicinity. Alterations, even small ones, can have detrimental and devastating effects upon these ecosystems. Previous studies demonstrate that hundreds of millions of tons of dust are transported each year across the Atlantic from the Sahara and Sahel regions of West Africa via trans-Atlantic air currents to the Western Caribbean. It has been theorized that non-indigenous bacteria are also traveling across the Atlantic concurrently and are thus introduced to new ecosystems. In order to test this hypothesis air samples were collected in Mali, Africa as well as the Western Atlantic region (St. Croix, St John and Trinidad). Sampling fell under two categories 1) non-dust events and 2) dust events. Dust events were indicated by USGS analysis of heavy metal isotope ratios. Upon investigation there were marked differences in the bacterial compositions within all sampling sites when comparing dust and non dust events. The results were then compared between sites also indicating significant differences among the air samples collected in Africa and those collected in the Western Atlantic. Within the Western Atlantic sampling sites significant changes were also noted in bacterial compositions as a result

of dust events. The preliminary results strongly support the hypothesis that bacteria are in fact being transported across the Atlantic. If these indications are correct, concerns should be raised about the likely detrimental effects resulting from the introduction of foreign bacteria to existing ecosystems.

#### CHRONIC TOXICITY TESTS ON STORMWATER FROM A NORTH AUGUSTA, SC WATERSHED

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This project assessed the extent of nonpoint source pollution in water samples collected from a wetland area located in North Augusta, SC, by performing chronic toxicity tests using *Ceriodaphnia dubia*. Nonpoint sources of water pollution are those that cannot be traced to any single, specific point of discharge. Examples of nonpoint source pollution include: oil and gasoline, fertilizers, and pesticides. The watershed of interest feeds into the Savannah River and includes a large commercial area, several housing developments, and the River Golf Club located in the floodplain. The stream was sampled both upstream and downstream of the golf course, in fair weather and during a rainstorm, to determine if the levels of pollutants in the water were toxic to aquatic organisms. The chronic toxicity tests involved exposing *Ceriodaphnia dubia* (water fleas) to water collected from the wetland for one full week and subsequent examination of their mortality and reproductive rates. There were four fair-weather tests and one rainstorm event test, for a total of four weeks and one week, respectively. Anion analysis was also conducted via ion chromatography to quantify the amounts of nutrients present (i.e., NO<sub>3</sub><sup>-</sup>, PO<sub>4</sub><sup>3-</sup>). The samples were also measured for pH and dissolved oxygen. Results of the fair-weather tests suggest that the golf course wetland filters and removes harmful nonpoint source pollutants from the runoff feeding into the Savannah River. Preliminary data from rain samples indicate that the wetland may not be as effective during periods of heavy rain.

#### DESIGN AND CLONING OF AN ANTI-LTR 491 HAMMERHEAD RIBOZYME

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Since its discovery in 1982, Acquired Immunodeficiency Syndrome (AIDS) has become one of the leading causes of death in the world. The causative agent of AIDS is the Human Immunodeficiency Virus (HIV-1). HIV is a lentivirus that encodes nine regulatory genes and contains a 5' and 3' long terminal repeat (LTR) regions. The LTR region controls viral replication and consists of a U3, R and U5 region. The 5' R region is the first transcribed element of the HIV genome and contains the trans-activating response element (TAR). Tar has importance because it is bound by the viral tat protein which enhances transcriptional elongation. Because, the region is a part of all HIV transcripts, it is a potential target for inhibition by hammerhead ribozymes. The hammerhead ribozyme is a catalytic RNA with an ability to cleave viral RNAs. This project describes the cloning of an anti-HIV-1 LTR hammerhead ribozyme targeted to nucleotide 491 of the HIV-1 subtype NL43 (Accession # M19921). This ribozyme was designed based on the model of Haseloff and Gerlach. The ribozyme template was synthesized and amplified to generate double stranded DNA which was cloned into pPCR-Script by blunt end ligation. The plasmid, pLTR 491, was verified by direct sequencing. In addition, a non-catalytic version of this ribozyme was designed and cloned in the same manner.

## THE USE OF MAGNETIC RECORDING FOR NANOSCALE METROLOGY

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We demonstrate that conventional magnetic recording technology can be employed for nanoscale position metrology with 16 nm position jitter. We recorded and read-back linear patterns of di-bit transitions to/from magnetic recording media with a recording head placed in contact with the media on travel piezoelectric surface. The scanning was performed using a 50 pm resolution, 15 flexure stage equipped with capacitance sensor feedback. The recording head was mounted to the piezo stage, which in-turn was mounted to a direct-drive crossed roller bearing mechanical stage with 50 mm of travel and 10 nm resolution provided by digitally multiplying the signal from a glass scale encoder. The di-bits were recorded by energizing the inductive write head with a current pulse while the head was held stationary with respect to the media. The di-bits were recorded over the 15 mm had a commanded separation of 1 scan range of the piezo stage, however only 6 dibits were read back due to read/write head offset and scan range. After reading these bits by scanning the piezo stage, we analyzed the di-bit pattern using the Williams-Comstock model for recording transitions and the Karlquist equation for the head field, which model the readback signal as a Lorentzian pulse. The width of the Lorentzian pulse depends on the write pole separation, the magnetic medium thickness, the magnetic transition parameter, and the head-to-medium spacing. Fitting our data with nonlinear least squares fitting yielded a 16 nm position jitter over 7 for the piezo stage with a 152 nm pole separation, a magnetic transition parameter of 17 nm, and a 7 nm head-to-medium spacing, reasonable parameters for the recording components used in contact recording. We then read back the di-bits using the crossed-roller bearing stage, and obtained a position jitter of 107nm with 181.9 nm fitted pole spacing, a transition parameter of 19 nm, and a 9 nm head-medium spacing. These measurements demonstrate that magnetic recording has great potential for cost-effective nanoscale position metrology and encoding for precision motion control applications.

## CLONING OF A HAMMERHEAD RIBOZYME TARGETED TO THE HIV-1 VIRION INFECTIVITY FACTOR

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HIV is a retrovirus that infects CD4<sup>+</sup> T<sub>H</sub> cells, resulting in a gradual deterioration of immune function and leading to the onset of Acquired Immune Deficiency Syndrome (AIDS). Current research suggests that HIV replication may be combated with ribozyme therapy. Hammerhead ribozymes are small, catalytic RNAs that can be designed to target and cleave substrate RNAs at sequence specific sites. Hammerhead ribozymes targeted to HIV-1 mRNAs have been shown to greatly reduce or inhibit viral replication. The HIV-1 *virion infectivity factor (vif)* gene encodes a protein that counteracts an innate, antiretroviral defense mechanism of non-permissive CD4<sup>+</sup> cells. This mechanism is mediated by apolipoprotein B mRNA-editing enzyme-catalytic polypeptide-like 3G (APOBEC3G), a cellular cytidine deaminase that is encapsulated into assembling virions in the absence of *vif* and is inhibitory during the next round of viral replication. *Vif* neutralizes APOBEC3G by reducing its translation and by rapid degradation of the native protein. *Vif* mRNA, therefore, may be a good target for ribozyme mediated inhibition of HIV-1 replication. A hammerhead ribozyme targeted to *vif* at nucleotide 5127 of the HIV-1 genomic clone NL43 (Accession number M19921) was designed to test this hypothesis. The ribozyme was synthesized as ssDNA and converted to dsDNA by PCR. The double stranded ribozyme was cloned into the plasmid pPCR-Script Amp SK(+).

Miniprep DNA was prepared from the resulting culture by the alkaline lysis procedure. One of the clones analyzed was verified by sequencing to contain Vif5127 ribozyme in an orientation inverted with respect to the plasmid's T7 promoter. This ribozyme, Vif5127, becomes a member of a library of three ribozymes targeted to various sites within the *vif* open reading frame. Future research will involve testing the catalytic activity of these anti-*vif* ribozymes.

POPULATION DYNAMICS OF A MONOGENEAN FOUND PARASITIZING THE  
ESOPHAGUS OF THE ATLANTIC CROAKER, *MICROPOGONIAS UNDULATUS*,  
IN THE SOUTH ATLANTIC BIGHT

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The monogenean *Diplectanotrema* sp. was found in the esophagus of the Atlantic croaker, *Micropogonias undulatus* in the Northwestern Atlantic Ocean. Fish were collected offshore from New Jersey to Florida during the fall and spring seasons from 2002 to 2004. The geographic range of *Diplectanotrema* sp. within the study area was found to be restricted to the South Atlantic Bight, stretching from Cape Hatteras, NC, to Cape Canaveral, FL. The population dynamics of this monogenean was studied within that area and additional samples were made during the summer of 2004. The fish analyzed ranged from 0-5 years old. Overall prevalence was 11.2% and mean intensity was  $7.3 \pm 2.1$  worms (N= 366). Effects of various biotic (host age, sex, and standard length) and abiotic (season, water temperature, and salinity) variables on prevalence and intensity of *Diplectanotrema* sp. were analyzed and tested using the G-test and Kruskal-Wallis test, respectively. Preliminary results showed a significant effect of season, water temperature, host age, and host sex on the prevalence of the monogenean. The monogenean was found only during the summer and fall seasons, with the highest prevalence in the summer (24%). Fish two years of age and older were not infected by the monogenean, and young-of-the-year (age 0) exhibited the greatest prevalence of infection (14.5%). Female fish were more often infected by *Diplectanotrema* sp. than male fish (11.8% and 2.1%, respectively). There was no significant effect of any of the variables examined on the intensity of the monogenean which showed a typical negative binomial distribution. \*Funded in part by NMFS/NOAA grant #NA17FF2885.

STUDIES OF THE SUZUKI-MIYaura CROSS-COUPLING BETWEEN BENZYL  
3,5-BIS(BENZYLOXY)-4-BROMOBENZOATE AND POTASSIUM  
VINYLTRIFLUOROBORATE UNDER THERMAL AND MICROWAVE PROMOTED  
CONDITIONS

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The formation of styrene derivatives is an important reaction and a common way to accomplish this is to utilize the Suzuki-Miyaura cross-coupling reaction. Potassium vinyltrifluoroborate, a safe and stable alternative to the vinyl boronic acid or ester, has been employed to study the vinylation of an electron-rich and sterically hindered aryl halide, benzyl 3,5-bis(benzyloxy)-4-bromobenzoate. \*Supported by NIH SC-INBRE Grant #P20 RR-016461



THE EFFECT OF AQUAPORIN 3 AND ORAL GLYCEROL APPLICATIONS ON  
WOUND HEALING IN MICE

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This laboratory has obtained evidence to support the idea that, together, AQP3 (aquaporin 3) and PLD2 (phospholipase D2), in the presence of glycerol, create phosphatidylglycerol, a unique signaling module involved in the differentiation and proliferation of epidermal keratinocytes. Thus, an experiment was performed to further investigate this signaling module and its interaction with glycerol. The utilization of glycerol to increase differentiation and decrease proliferation in keratinocytes could have positive ramifications in wound healing and in the treatment of skin diseases resulting from abnormally increased proliferation, including psoriasis and non-melanoma skin cancers. An experiment utilizing transgenic mice displaying an overexpression of AQP3 gene (HK1-AQP3 TG mice) was designed to compare wound healing rates. The effects of oral glycerol applications were also explored. A full thickness wound was administered in the flank of the mouse. Four groups of mice were established: transgenic and non-transgenic mice treated with oral glycerol in the water supply and transgenic and non-transgenic mice receiving no treatment. The rates of wound healing were measured and analyzed. Initial analysis of data indicates oral glycerol accelerates wound healing due to increased glycerol transport and, in turn, increased differentiation and decreased proliferation; however, no differences in wound healing were noted between the transgenic and non-transgenic mice.

DEAD RULERS TALKING

**Kristen Huete** and James McKim  
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Too often students learning new material are not given the opportunity to apply that knowledge to anything, so that they do not quite understand what is being taught. By teaching a computer science course as project oriented, we the students are able to go from listening to the instructor in lecture to applying that information firsthand to our own systems. The project, focused on making world rulers (real or unreal, living or not) talk to each other, helped us develop a sense of problem-solving as we made the system easier to use and more presentable for the user. It also was fun and interesting, so that we had a desire to work harder to make the system better and thus more enjoyable for the user. A project based course also instills the importance of using a schedule and deadlines, to keep us from spending too much time on something that is not necessary to the system. Working in pairs of two in the lab helped make us feel more at ease and helped us to understand and apply classroom knowledge better and more creatively, since we had someone to confer with while working.

IDENTIFICATION OF POTENTIAL DRUG THERAPY TARGETS FROM  
*ENTAMOEBIA HISTOLYTICA*

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*Entamoeba histolytica* is an enteric protozoan parasite that infects 10% of the world's population resulting in approximately 50 million cases of invasive amoebiasis annually. EhRabA, a unique Rab GTPase in *E. histolytica*, contributes to virulence of this pathogen by regulating cell motility, cell polarization, cell adhesion, and production of cytolytic

proteins. The mechanism(s) by which EhRabA participates in the aforementioned processes is unknown however identification of EhRabA-interacting proteins may provide insight. The absence of an EhRabA homolog in human hosts would make the unique biology it regulates a potential target for drug therapy. The yeast dihybrid system is being used to identify proteins that interact with EhRabA. NdeI and SalI restriction sites were engineered at the 5' and 3' ends, respectively, of the EhRabA gene. The PCR products were digested and then ligated into the yeast vector, pGBK. The resulting "bait" plasmid was transformed into the haploid yeast strain *Saccharomyces cerevisiae* AH109 using the lithium acetate-PEG method and grown on synthetic defined agar plates lacking tryptophan (SD/-Trp). Preliminary results from a western blot shows that the EhRabA protein is being expressed in yeast. The "prey library", an *E. histolytica* cDNA library kindly provided by Dr. Barbara Mann, University of Virginia, Charlottesville, has been transformed into the yeast strain expressing EhRabA. Positive protein interactions will be selected by plating the cells on SD agar lacking tryptophan, leucine, adenine, and histidine (SD/-Trp/-Leu/-Ade/-His). \*Supported by South Carolina EPSCoR IDeA Collaborative Research Program

MCF-7 CELL PROLIFERATION – EFFECTS OF A SHORT-TERM TREATMENT BY  
17BETA-ESTRADIOL AND TAMOXIFEN

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MCF-7 human breast cancer cells are widely used for experimental studies of tumor biology. Conflicting results have often been obtained with the estrogen receptor (ER) positive MCF-7 cells when it relates to the actions of estrogens and tamoxifen. Even the extent of proliferative response induced by 17beta-estradiol varies. Tamoxifen (TAM) can act as a weak estrogen agonist or an estrogen antagonist (anti-estrogen) by competitively binding to the ER, and may decrease cell proliferation. The purpose of the current study was to examine MCF-7 cell DNA synthesis as a measure of cell proliferation following a short-term in vitro treatment with 17beta-estradiol and tamoxifen. 17beta-estradiol ( $10^{-8}$  and  $10^{-6}$  M) and tamoxifen ( $10^{-8}$  and  $10^{-6}$  M) were added to cultured MCF-7 cells maintained on a coverglass placed within a 35mm Petri dish, and incubated for 24 hours. Control cultures received 0.1% BSA or 0.1% DMSO containing media. Experiments were repeated three times. Morphological changes were observed under a phase-contrast microscope. We have employed an immunohistochemical assay for the detection of 5-bromo-2'-deoxy-uridine (BrdU) incorporated into cellular DNA. This is a non-radioactive assay to measure DNA synthesis or cell proliferation. The number of BrdU labeled cells was determined and counted under a microscope. The  $10^{-6}$  M and  $10^{-8}$  M 17beta-estradiol increased proliferation of MCF-7 cells significantly ( $P < 0.05$ ). Tamoxifen at  $10^{-6}$  M or  $10^{-8}$  M did not alter BrdU labeling when compared to the control groups. These results indicate that exposure of estrogen and tamoxifen to human breast cancer cells yielded different results in terms of DNA synthesis, i.e., if the breast cancer cells are treated for a short-term with estrogen, the cells will proliferate, and if these cells are treated with tamoxifen then DNA synthesis remains unchanged. \* Supported by grants from NIH GM068627, HD38342, MD00233, INBRE RR16461 (EPSCoR/CRP) and NSF HRD-0217602

HAIRLESS FOXES OF THE LOWCOUNTRY: MYSTERY ANIMALS' IDENTITY  
CONFIRMED

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Last summer, reports of odd-looking creatures in several parts of the Lowcountry made their way onto local television news and newspapers. These "mystery animals" were described as having "kangaroo-like heads, big upright ears and a long rat-like tail." Initial speculations of its identity included a wide range of unnatural crossbreeds. SCDNR Wildlife officials suggested it might be fox with the rare "Samson" condition, a congenital anomaly that affects the fur coat. In August, one of these animals was found dead on a road in Mt. Pleasant; the animal was apparently hit by a car. The finders brought the carcass to the College of Charleston where the animal's identity and the possible causes for the dramatic hair loss, such as skin parasites, diseases, and genetic dispositions were researched.

The animal found in Mt. Pleasant was a young male whose body completely lacked hair except for a few parts with only sparse guard hairs. Virtually no undercoat was observed. Tissue samples were sent to UCLA, where DNA analysis confirmed that this specimen was a Gray Fox, *Urocyon cinereoargenteus*. To determine the potential causes of the abnormal hair loss in the specimen, it was taken to the Southeastern Cooperative Wildlife Disease Study (SCWDS), at the College of Veterinary Medicine of the University of Georgia, where a necropsy was performed. The animal was found to be in fair nutritional condition. A few localized patches of inflammation were observed on the skin, but were not extensive enough to account for the extensive hair loss. No evidence of disease and no parasites were observed in the body. Skin sections revealed a lower number of hair follicles than typical of gray foxes. No evidence of skin parasites, such as mites that can cause mange, was observed.

The cause of the hair loss is, therefore, unknown. This does leave congenital conditions as a possible explanation; having fewer hair follicles indicates that the abnormal fox is unable to grow the lush coat typical for gray foxes. The appearance of these abnormal foxes may be showing a similar population growth to the Samson foxes of Finland during the 1930s and 1940s. The degree of correlation is yet undetermined.

REFLECTANCE MEASUREMENTS OF PHOTOSENSITIZED TISSUE PHANTOMS

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A long-term goal of our research group is to develop a non-invasive optical method to determine the photosensitizer content of tissues in vivo. The absorption spectra of blood and porfimer sodium is very similar in the visible region, making it difficult to detect the presence of therapeutic amounts of porfimer sodium with optical methods. We are currently experimenting with measurements of fiber optic reflectance of tissue phantoms in order to determine the effect of known amounts of the photosensitizer, porfimer sodium, on reflectance spectrum. The experimental setup includes a fiber optic bundle that is used for light delivery and collection, a halogen lamp and an Ocean Optics fiber optic spectrometer. The tissue phantom is composed of bovine blood, intralipid and saline. The blood content is varied from 1 percent to 7 percent by volume. The porfimer sodium

content is varied from 0.5 mg/kg to 10 mg/kg. The reflectance spectra will be analyzed with multicomponent analysis. The experimental results will be presented in this talk along with a discussion of their potential clinical significance.

#### GERMINATION PHYSIOLOGY OF OKRA AND MUSTARD SEEDS UNDER SALT STRESS

**Julia Jones** and Ajoy G. Chakrabarti  
South Carolina State University

The effect of salt stress (0.2-0.8M Sodium Chloride) on percent germination, percent lipid synthesis, and percent water absorption was investigated. The germination test and water absorption was done in Petri dish germinators. Seed germination was recorded daily while the water absorption was measured every 2 hours for a period of 12 hours, since soaking with distilled water. The lipid extraction was done gravimetrically using petroleum ether solvent for extraction of lipids. Sodium Chloride seems to affect the percent germination in the mustard seed species and it was lowest at 2 percent at 0.8M salt concentration. In Okra seed species the salt concentration did not affect the percent germination and 11.20 percent was the lowest in the control experiment. In lipid synthesis Okra seed species showed the highest lipid percent at 14.40 percent at the control experiment and the lowest lipid percent per unit fresh weight was 0.2 percent at 0.6M saline concentrations. As for Mustard seed species the highest lipid percent was 18.0 percent in 0.8M concentration, and the lowest was 6.6 percent in 0.5M salt concentration.

#### A SURVEY OF BLOOD PARASITE PREVALENCE AND ASSOCIATIONS WITH BOVINE TUBERCULOSIS IN AFRICAN BUFFALO (*SYNCERUS CAFFER*).

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Bovine tuberculosis (bTB) is capable of altering fitness of African buffalo (*Syncerus caffer*), rendering infected hosts more susceptible to environmental stressors and infection by other parasites. Haematological studies examining blood parasites in free-ranging buffalo have been few and limited in scope. In this study, we examined patterns of blood parasite infections in bTB positive and negative buffalo in Hluhluwe-iMfolozi National Park (HiP), South Africa. We screened 199 individuals for blood parasites using Giemsa-stained thin-film blood smears assessing blood parasite prevalence and parasitaemia. Veterinary health parameters such as age, body condition, naematode egg count, and pregnancy status were also documented. Three parasites, *Anaplasma*, *Babesia*, and *Theileria*, were identified in the study population, and 16% of buffalo screened were positive for at least one parasite. Four of 24 bTB-infected buffalo (16.7%) were infected with blood parasites, compared to 21 of 153 bTB-negative buffalo (13.7%), suggesting that bTB-infected hosts are not more likely to be infected with blood parasites ( $X^2 = 0.095$ ;  $P = 0.758$ ). No differences in parasite infection were detected between males and females ( $X^2 = 0.034$ ;  $P = 0.854$ ). There was also no significant relationship in parasite prevalence between juvenile and adult hosts ( $X^2 = 2.51$ ;  $P = 0.113$ ). *Babesia* was the most common parasite identified; of the buffalo testing positive for blood parasites ( $N=32$ ), 28 (87.5%) were infected with *Babesia*. *Babesia* and *Theileria* co-infections also occurred, with approximately one-quarter of *Babesia*-infected individuals also harbouring *Theileria*. Future analyses will investigate possible associations between blood parasites and host

condition and pregnancy status to explore potential effects of these parasites on host fitness. Studies of parasite prevalence in relation to bTB status and host demographic variables will help improve our general understanding of the ecology of infectious diseases in wildlife populations harbouring multiple parasites.

STATISTICAL PROCESS CONTROL TOOLS APPLIED TO ASSISTED  
REPRODUCTIVE TECHNOLOGY(ART)

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Many infertile couples have turned to assisted reproductive technology as their last hope for conceiving children. In the ART process, oocytes that are normally fertilized are nurtured to the four- to eight-cell stage of development and transferred into the uterus of the female. Numerous factors affect the success of ART, which can be defined as a clinical pregnancy or a live birth. This study examines applications of Statistical Process Control and Six Sigma concepts to improve the ART process, using historical data from ten years collected at GHS, Greenville SC. Specific process monitoring tools and implementations procedure are reported.

A MODEL OF INTERNAL PATIENT FLOWS AND RESULTING NURSING UNIT  
OVERFLOWS IN A UNIVERSITY HOSPITAL

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This research used actual patient census data from MUSC Hospital to create a matrix of the probabilities of moving from one nursing unit of the hospital to another as well as admissions and discharges on any given day. From this matrix, an expected value model and a stochastic model of patient flow were created and used to calculate the expected equilibrium states of each nursing unit and to create an algorithm that predicts the chance of overflows given initial conditions in the hospital. A strong correlation was discovered between the ratio of equilibrium occupancy to maximum bed availability in a nursing unit and the number of overflows in that unit during an extended run of the stochastic simulation.

FORENSIC DISCRIMINATION OF BALLPOINT PEN INK USING UV/VISIBLE  
MICROSPECTROPHOTOMETRY AND MULTIVARIATE STATISTICS

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The objective of this research is to determine the usefulness of UV-Visible microspectrophotometry (MSP) and multivariate statistics in discrimination between similarly colored ink samples. Forensic document examinations include separation, identification, quantitation, and age determination of inks deposited onto paper during the writing process. Frequent issues include determining the age of the writing, whether the same pen was used on two different documents, whether multiple entries were written at the same time, or whether a document was altered. The diverse chemical structures of the components in ink provide a chemical basis for the ability to discriminate and identify their characteristic materials.

We have collected ink samples from various brands of black and blue pens to test for inconsistencies within manufacturing processes and to evaluate the relative discriminating power of UV-Visible MSP and multivariate statistics. This method offers simple, direct, non-destructive analysis of ink on questioned documents that are similar in color but contain different chemical composition. The MSP was operated in transmission mode using a xenon source and a 35X collecting objective. Spectral groups were analyzed using a combination of linear discriminate analysis (LDA) and principal component analysis (PCA). These multivariate statistical methods confirm differences in spectra that are not always visually different. The designed experiments performed in this research, combined with analytical discrimination between inks on questioned documents, may suggest improvements in forensic document examinations for casework studies.

#### OBSERVATION OF PARAMAGNETISM IN AU THIN FILMS THROUGH ORGANIC CHEMISORPTION

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Organic molecules adsorbed on metals have been heralded as building blocks for future "molelectronic" devices. Giant paramagnetism has recently been observed when organic molecules are chemisorbed onto gold nanoparticles and thin films. It has been proposed that the electrostatic repulsion-induced charge transfer which occurs upon thiol chemisorption may lead to this unique magnetic state. Using a vibrating sample magnetometer (VSM), with different sample holder geometries and materials, we have tried to reproduce these measurements for dodecanethiol and octadecanethiol self-assembled monolayers on Au films. While some of our samples films have shown paramagnetic moments as high as several hundred Bohr magnetons per adsorbed atom, similar to previous measurements, others have shown weaker paramagnetic moments, diamagnetic moments, or even no response within the detection limits of our VSM. We will present a statistical analysis of our VSM sensitivity, and discuss how it affects our threshold for detecting Au-thiol paramagnetism, as well as the sample parameters which may affect the onset of magnetism. We will discuss how combined Electrostatic and Magnetic Force Microscopy of these alkanethiols may allow one to establish the origin of the magnetism.

#### STRONG BASE SYNTHESIS OF SYMMETRICAL TRIKETONES

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Symmetrical triketones, such as 1,5-diphenylpentane-1,3,5-trione, were prepared by the condensation of acetone with two equivalent amounts of aromatic esters using lithium hexamethyldisilazide (HMDS) as a base. The use of x-ray crystallography proved necessary in order to conduct full characterization. Several of the triketones prepared were new compounds, and each was additionally characterized using melting point, infrared spectroscopy, NMR, and elemental analysis.

It was originally proposed that the monoanion of acetone could be condensed via a Claisen condensation with aromatic esters to give the dianion of substituted arylacetones, which have tremendous synthetic potential. These dianions could then be further condensed with select esters, such as methyl salicylate, methyl thiosalicylate, or methyl anthranilate,

and cyclized to give various heterocyclic products in a single-pot procedure. Condensations performed using lithium diisopropylamide (LDA) as a base yielded only known diisopropylamides as a result of the usually non-nucleophilic LDA condensing with both esters used. When LHMDs was used as a base, a different reaction course was observed. Full characterization of the obtained products was not possible without obtaining an x-ray crystal structure for one product, which showed it to be a symmetrical triketone. This was most likely a result of the monoanion of acetone condensing with an ester, as expected, but then rapidly undergoing a second condensation with the same ester. The procedure used in the preparation of these symmetrical triketones is an improvement over previous methods. The yields of the products were generally around 60%. As with all polyketones, these products also have further synthetic potential.

#### RELATIONSHIPS BETWEEN RELATIVISTIC JET ORIENTATIONS AND BLACK-HOLE ACCRETION DISKS

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Black hole accretion disks have been a strong topic of research for the past three decades. Since black holes themselves cannot produce emissions of any type, all knowledge of them comes from observations of surrounding matter, often in the form of a disk orbiting the black hole. These disks are sources of high-energy emissions, including high-speed jets. These jets are known to span distances of megaparsecs, and are energetic enough to be observed at cosmological distances.

Despite their astonishing sizes and speeds, many jets demonstrate an extremely linear structure, even along hundreds or thousands of kiloparsecs. However, other jets have been found to exhibit conical precession, ejecting a corkscrew of plasma into space. This unusual behavior leads to an important question: What characteristics of accretion disk systems define the orientation of their jets?

Since black holes are often rotating rapidly, one possibility is that the jet's orientation is set by the angular momentum of the black hole. Another possibility is that the angular momentum of the disk determines the jet's orientation. Thus far, most models have assumed both momenta are aligned, making it difficult to disentangle which account for the jet's structure. Our numerical simulations, on the other hand, break this degeneracy by tilting the disk with respect to the spin axis of the black hole. At this point our work is preliminary, but we demonstrate that our simulations do produce high velocity jets that vary in both direction and power.

#### BACTERIAL CONTAMINANTS IN PAU D'ARCO AND BLACK COHOSH

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Pau D'Arco, *Tabebuia avellanedae*, is a tree that has been used as an herbal remedy for many years as a cure all. It has been used as an alternative medicine for the common cold as well as cancer. Black Cohosh, *Cimicifuga racemosa*, is a root that has been used by women experiencing menopause. It has been recorded to have high estrogenic activity. Our experiment is designed to test these products for bacterial contamination. Samples of Pau D'Arco bark and the black cohosh root were plated on tryptic soy broth agar (general bacteria media), Nash-Snyder (*Fusarium* medium), and MacConkey agar (enteric bacteria medium). A majority of the contaminants isolated were bacterial (270 of 273). Only one isolate from the black cohosh was an enteric bacterium (0.4% of total bacteria).

The bacterium was identified as *Enterobacter cloacae*. This bacterium has been found to cause infections in the digestive track. Pau D'Arco bark produced 2.3E3 bacteria per gram of material. Of these bacteria, 85.8% were *Bacillus*, with three identified to the species level of *B. pumilus* and *B. megaterium*, 7.1% were *Paenibacillus*, and 7.1% were *Cellulomonas*. Pau D'Arco tablets produced no contaminants. Black cohosh root produced 8.16E3 bacteria per gram of material. Of these bacteria, 51% were *Bacillus*, with two identified to the species level of *B. megaterium*, 43% were *Paenibacillus*, 2% were *Actinomadura*, and 4% were *Curtobacterium flaccumfaciens*. The black cohosh tablet contained 1.042E3 bacteria per gram of material. Of these bacteria, 94.8% were *Bacillus*, with four identified to the species level of *B. megaterium*, *B. pumilus*, and *B. sphaericus*, and 5.2% were *Curtobacterium*. *Actinomadura*, *Bacillus*, *Curtobacterium*, *Cellulomonas*, and *Paenibacillus* are common soil organisms. Low levels of contamination observed with the Pau D'Arco indicate that there are possible antibacterial properties in this plant which is currently being investigated.

SYNTHESIS OF AN "ALKYL IMIDAZOLE" INHIBITOR OF AP2: A NEW  
APPROACH FOR DIABETES TREATMENT

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Adipocyte fatty acid binding protein (aFABP, aP2) is a 14.6 kDa cytosolic protein located in adipocytes and macrophages and assists in the intracellular transport of fatty acids. 1a,b,c,d It is one of a class of fatty acid binding proteins (FABPs) that are found predominately in the liver, heart, intestine and connective tissues. Hotamisligal et al. have reported that aFABP deficient mice, when placed on a high fat diet (40% of caloric intake as fat), were significantly protected from hyperinsulinemia and insulin resistance compared to the wild type. 2 Additional genetic experiments have been reported in which aFABP null mice have been crossed with ob/ob and in another instance apoE<sup>-/-</sup> mice. The aFABP deficient ob/ob mice were more insulin sensitive when compared to ob/ob controls as demonstrated measuring by circulating glucose and insulin levels. 3 Based on these genetic knock-out models, we pursued the development of inhibitors of aFABP for their therapeutic potential in the treatment of diabetes. Herein we disclose the synthesis of an imidazole derived inhibitor of ap2. 4. Supported by NSF-HBCU-UP #0411383

EXPRESSION AND ACTIVITY OF GAMMA-AMINOBUTYRIC ACID RECEPTOR  
(TYPE A) IN PROSTATE CANCER

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The neurotransmitter gamma-aminobutyric acid (GABA) has been recently reported to increase the proliferation of prostate cancer (Pca) cell lines via the GABA<sub>A</sub> receptor (GABA<sub>A</sub>r) and to promote Pca invasiveness via the GABA<sub>B</sub> receptor. In this study, we have investigated, by immunohistochemistry, the expression of GABA<sub>A</sub>r in 12 normal, 17 benign prostatic hyperplasia (BPH) and 148 human Pca specimens. GABA<sub>A</sub>r immunoreactivity was either absent or present at low levels in the normal human prostate and BPH specimens, both in the stromal as well as in the epithelial compartments. In contrast, moderate to high GABA<sub>A</sub>r levels were found in the stroma of 32 (22%) Pca specimens. Also, low to moderate GABA<sub>A</sub>r, epithelial staining was observed in 50 \*34% Pca specimens. In addition, we have examined the effects of several GABA agonists and antagonists on the in-vitro growth of four human Pca cell lines: androgen-unresponsive



DU-145 and PC3, androgen-responsive LNCaP and MDA-PCA-2b. Isoguvacine, a GABA<sub>A</sub>-selective agonist, at doses between 5-50 ug/mL (31-155 uM) stimulated the proliferation of all four Pca cell lines, with 40%-70% maximal growth-stimulation observed. Baclofen, a GABA<sub>B</sub>-selective agonist, at doses up to 50 ug/mL (234 uM) did not have a significant effect on growth. When tested at concentrations up to 100 ug/mL, bicuculline and picrotoxin (GABA<sub>A</sub>-selective antagonists) and saclofen (GABA<sub>B</sub>-selective antagonist), also did not have significant growth-inhibitory effects. However, dihydroergotamine, which is known to bind the GABA<sub>A</sub> chloride ion-channel and reduce GABAergic transmission, inhibited the proliferation of all four Pca cell lines. These data suggest a role for GABA<sub>A</sub> in the growth of Pca.

#### CERAMIC CAPACITORS FOR CRYOGENIC NMR RF CIRCUITS

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Nuclear Magnetic Resonance (NMR) Spectroscopy experiments at low temperatures (under 100 K) will increase (possibly by a factor of 4) the Signal-to-Noise (S/N) Ratio of the spectrometer signal and therefore enhance the resolution of the resulting spectra. Currently available instruments are limited in that the cooled sample must be insulated from the RF imaging coil portion of the instrumentation, pushing the coil further from the sample of interest; therefore offsetting the low temperature gains in S/N and efficiency. Commercially available ceramic capacitors - in the case sizes that will fit in an insulated narrow bore NMR probe - are a limiting factor in the RF tuning portion of this probe development due to their voltage handling in low temperature environments. My efforts have focused on testing and manufacturing of simple capacitors that will meet the voltage handling requirements in the low temperature environment, typically in helium gas (e<sup>3</sup>kV RF pulse at 75-90 K).

Two designs have been studied: 1) a coaxial capacitor, and 2) a circular disc capacitor. In both cases the dielectric material for the capacitors was Alumina and the conductors were copper. For the coaxial capacitors, copper cylinders were manufactured for a snug fit with the alumina. The resulting voltage breakdown occurred at 1.8kV in 1 ATM nitrogen gas environment, and only 1.6kV at approximately 135K. The difference in thermal expansion produces an air gap at the interface which decreases the voltage limit of the capacitor. A disc capacitor made from alumina sheet fused with copper foil doesn't see this same expansion. The disc type netted an increase in breakdown voltage of more than 50%. Most of the stray electric fields for the capacitors occur at the edges of the conductors. To minimize this effect, a vacuum deposition conformal coating, Parylene, was applied to the conductors. We have successfully been able to achieve 3.4kV at 80 K. Additional testing is required to verify the voltage at 25-30K. Work Supported by NIH SBIR Grant 8R44EB00152-04 and by Doty Scientific, Inc.

#### DESIGNING AND CLONING A HAMMERHEAD RIBOZYME TARGETED TO NUCLEOTIDE 571 OF THE HIV-1 GENOME

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The Acquired Immune Deficiency Syndrome (AIDS) is caused by the Human Immunodeficiency Virus (HIV), and is characterized by a progressive destruction of the immune system due to the loss of CD4+ TH cell population. HIV is a positive sense retrovirus with a diploid RNA genome, which encodes nine genes whose expression is controlled by viral regulatory sequences in the 5' and 3' Long Terminal Repeat (LTR)

sequences. Each LTR consists of three regions described as U3, R, and U5. The 5' U3 region acts as the viral enhancer/promoter and controls transcription of all viral mRNAs, each of which initiate in the R region. Because the 5' R and U5 regions are transcribed as part of all viral mRNAs, they are important targets for inhibition. One way to inhibit RNA's specifically is by the use of ribozymes, which are catalytic RNA molecules that cleave substrate RNAs in a sequence specific manner. A catalytic hammerhead ribozyme targeted to the 5' LTR U5 region was designed according to a model proposed by Haselhoff and Gerlach. This ribozyme consists of two flanking sequences, each twelve nucleotides long, that were created to be complementary to the coding strand on either side of the target site, a GUU at nucleotide 571 of the HIV-1 genomic clone NL43 (Accession number M19921). The ribozyme's catalytic core was inserted between the flanking regions to complete the design. The ribozyme sequence was converted to dsDNA and used to design forward and reverse PCR primers. The primers and dsDNA sequences were synthesized, and the resulting LTR 571 ribozyme template DNA was amplified to make multiple copies suitable for cloning. The LTR 571 Rz was cloned into the plasmid, pPCR-Script, by blunt-end ligation. Colonies were analyzed for the presence and orientation of the LTR 571 ribozyme. Sequencing was used to verify this analysis.

GEOGRAPHIC VARIATION IN THE MORPHOLOGY OF *HEMIDACTYLUS*  
*BOWRINGII* IN MYANMAR AND YUNNAN, CHINA

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Institution

The Southeast Asian country of Myanmar (formerly Burma) has five currently recognized species of geckos within the genus *Hemidactylus*. *Hemidactylus* are united by derived traits in toe morphology of the manus and pes, with sizeable variation among species in other traits. These variations make *Hemidactylus* a systematically difficult group. A recent molecular study shows genetic divergences within the tropical Asian clade, consisting of two monophyletic groups (Carranza & Arnold, 2006). The purpose of this project was to conduct a systematic study of one Burmese species, *H. bowringii*, to determine if morphological differentiation has occurred alongside the genetic divergences. Mensural and meristic characters were adapted from Zug et al., 2003. Data were collected from samples from throughout Myanmar and Yunnan, China and analyzed using Systat 11. Results show significant ( $P < 0.05$ ) differences between the two *H. bowringii* clades. Additionally, morphological differentiation occurs throughout other regions in Myanmar, with potentially more divergences within this species than represented in the phylogeny.

THE ROLE OF THROMBOMODULIN IN PROSTATE TUMOR CELL MIGRATION

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Thrombomodulin (TM) is an endothelial transmembrane receptor that regulates coagulation by binding to thrombin and activating the protein C system. TM is also expressed by prostate cancer (CaP) cells. CaP associated TM activates the protein C system. We investigated if TM expressed by CaP cells may also be involved in tumor progression by determining its ability to regulate tumor cell migration. PC-3 and DU-145 CaP cell lines were incubated in a Boyden chamber in the presence and absence of monoclonal antibodies to each extracellular domain of TM and amount of cell migration

determined. The extracellular domains of TM include an N-terminal lectin-like domain, six epidermal growth factor-like (EGF) domains, and a serine-threonine rich domain, which is differentially glycosylated with a chondroitin sulphate moiety. We determined that monoclonal antibodies to the chondroitin sulphate domain increased the ability of both PC-3 and DU-145 cell lines to migrate. We also investigated if CaP cell invasion was regulated by thrombin, protein C, and activated protein C. We determined that PC-3 and DU-145 cell migration was not regulated by these TM-associated proteins. We conclude that the chondroitin sulphate domain of CaP cell TM regulates cell migration. Supported by South Carolina NIH INBRE grant, Freedland Foundation, McKay Urology Endowment Fund.

THE ROLE OF OXYR IN THE OXIDATIVE STRESS RESPONSE OF  
*MORAXELLA CATARRHALIS*

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*Moraxella catarrhalis* is the third most common cause of otitis media resulting in the diagnosis of three to four million cases in the United States. During the development of otitis media, the innate immune system responds by recruiting neutrophils into the middle ear cavity. Neutrophils are phagocytic cells that ingest and kill microbial invaders. Consequently, during the development of otitis media, *M. catarrhalis* must contend with the oxidative killing mechanisms of neutrophils. I hypothesize that *M. catarrhalis* combats oxidative killing by producing antioxidant proteins whose genes are controlled by the transcriptional regulator OxyR. In order to identify the regulatory regions to which OxyR binds, recombinant OxyR was produced. Disk diffusion assays were used to determine the effects of the oxidants hydrogen peroxide and cumene hydroperoxide on the survival of a *M. catarrhalis* oxyR mutant. Through the use of a gentamicin protection assay, the survival rates of the oxyR mutant in neutrophils were examined. Using disk diffusion assay, the oxyR mutant proved to be more sensitive to cumene and hydrogen peroxide than the wild type strain at all concentrations tested. The greatest difference was observed at 30% cumene and 30% hydrogen peroxide at which the mutant had a 31% larger zone of inhibition, respectively, than the wild type strain. A pilot experiment using the gentamicin protection assay showed that over a time period of three hours the oxyR mutant had a smaller survival rate than wild type strain. For production of recombinant OxyR, the oxyR gene was PCR amplified from *M. catarrhalis* genomic DNA and cloned into the pBAD His expression vector. The orientation of the oxyR gene was positioned downstream of the His tag sequence in 50% of the plasmids. Sequencing of the clones verified that the oxyR gene was in frame with the His tag sequence. The data from these experiments will allow a better understanding how *M. catarrhalis* responds to body's immune system.

EXAMINATION OF BIOLOGICAL ACTIVITY ATTRIBUTED TO  
*LAGERSTROEMIA SPECIOSA*

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Herbal products over recent years have become mainstream to U.S. consumers, yet little if any real research has been conducted on herbals. This study was performed on products and extracts of the Banaba plant. Both a Banaba Tea and the weight loss supplement, Glucotrim, were examined for biological contamination on MacConkey agar, Nash-Snyder medium, and Tryptic Soy Broth Agar (TSBA) medium. The Banaba Tea was found to

contain *Bacillus subtilis*, *B. Lentimorbus*, *B. pumilus*, and *B. cereus* while the product Glucotrim produced only one colony of growth which was inconclusively identified. The active compound of the Banaba plant has been identified as corosolic acid which was subjected to an Agrobacterium potato tumor assay,  $\gamma$ -estrogen receptor binding assay, and a preliminary MTS MCF7 breast cancer cell assay. Corosolic acid showed tumor growth in the Agrobacterium potato tumor assay. At a 1:10 dilution of corosolic acid there were four times as many tumors growing as there were on the PBS control. The  $\gamma$ -estrogen receptor binding assays showed considerable estrogenic activity. However, contrary to the Agrobacterium study, the preliminary MTS MCF7 assay illustrated that corosolic acid significantly inhibits the growth of cancer cells in an estrogen receptor positive cell line.

#### THE EFFECTS OF TRANSCRIPTION FACTORS AND AGENTS ON GENE EXPRESSION

**Yarbough Miller**, Lakesha Meredith, Ashley McClary, Katherine Harris, and  
Deborah R. Crawford

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In developed countries, cancer is one of the leading causes of death. Some of the common forms of cancer that have been clinically researched are colorectal cancer, prostate cancer, pancreatic cancer, testicular cancer, breast cancer and ovarian cancer. A lot of emphasis has been put on prevention and screenings of various types of cancer and many tumor markers have been identified for those different types of cancer. The objective of this project is to investigate the expression of genes at the DNA and protein levels using cancerous and non-cancerous cell lines. Gene expression will be investigated, via receptor mediated endocytosis (i.e., DNA transfections) and via the introduction of hormones and other agents to the cell lines. It is our hope that the preliminary data will enhance our understanding on how to alter gene expression in cancerous cells. A correlation will be sought between the regulation of gene expression and possible treatments of various cancers. Supported by NSF-HBCU-UP #0411383

#### VIABLE FUNGAL SPORES FROM AFRICAN DUST FOUND IN THE CARIBBEAN

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Past research has shown that hundreds of millions of tons of dust particles are transported every year by winds from Africa to the Caribbean. Two fungal pathogens, one in corn and one in sea fans, have already been found to survive the this trip across the Atlantic Ocean. In this study, air was collected using filters at sites around the USVI, Hawaii and Trinidad, as well as Mali. The filters were plated on Yeast Extract Glucose media (YEG), and the subsequent fungi were isolated and metabolically characterized using the BIOLOG identification system. Fungi concentration was then compared between dust and non-dust movements to measure which fungi were in fact traveling with the wind from Africa to the Caribbean. Samples from the Caribbean during dust movements were found to have a greater percentage of the fungal genera *Aspergillus*, *Scopulariopsis*, and *Penicillium*, than in non-dust movements from the same sample sites. Concurrently, samples of dust taken from Mali were found to have similar fungal compositions when compared to the dust-samples in the Caribbean. This demonstrates a correlation between fungi in the Caribbean during dust movements and the wind transported dust from Africa.

## THE ROLE OF *SUF*A IN FE-S CLUSTER ASSEMBLY

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The *sufA* and *isc* pathways are known to be Fe-S cluster biosynthetic pathways in *Escherichia coli*. These pathways are required to construct Fe-S cluster cofactors for use in electron transfer and substrate activation reactions in a variety of important enzymes. Of particular interest is the *suf* pathway because it appears to be activated under conditions of iron starvation and oxidative stress. The *suf* operon, *suf*ABCDSE, contains genes for six proteins. Like the other *suf* proteins, *sufA* is being studied in an effort to characterize it and determine its role in the assembly of Fe-S clusters. A protein encoded by the *isc* operon, *iscA*, is thought to be homologous to *sufA*. In support of this claim is the fact that mutant *E. coli* strains with either the *sufA* or *iscA* gene deleted and a double mutant strain with both genes deleted show phenotypes consistent with disruption of Fe-S cluster assembly in vivo. Studies reveal that the *sufA/iscA* double mutant only grows when given a carbon source that can be metabolized via a pathway that does not require Fe-S cluster enzymes, while its growth is greatly diminished when given a carbon source that does require Fe-S cluster enzymes for metabolism. However, the single mutants do not show these growth defects. This suggests that *sufA* and *iscA* can functionally substitute for one another. Further growth experiments revealed other mutant phenotypes that support the hypothesis that deleting both the *iscA* and *sufA* genes disrupts Fe-S cluster biosynthesis, which in turn disrupts pathways that require Fe-S clusters. Gene reporter assays are currently being used to determine if iron metabolism or cellular redox status are altered in the *sufA* and *iscA* mutant strains in order to better understand their role in Fe-S cluster assembly.

## COMPARATIVE HISTOPATHOLOGY OF THE DIGENEAN TREMATODES INHABITING THE LUNGS AND URINARY BLADDER OF *RANA PIFIENS*

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Thirty seven leopard frogs, *Rana pipiens*, obtained from Nashville, Tennessee, were examined for parasitic trematodes. Two species of trematodes were found: *Haematoloechus medioplexus* in the lungs and *Gorgoderia amplicava* in the urinary bladder. Of the 37 frogs examined, the parasite prevalence for *Haematoloechus* was 76% and mean parasite intensity was 7. Along with *Haematoloechus*, parasitic nematodes, *Rhabdias* sp., were also found frequently in the lungs with prevalence of 89% and mean parasite intensity of 8. Some hemorrhaging and copious mucus were observed in the lungs that were infected with both flukes and nematodes. There was no significant difference in the parasite intensity between the right lung and left lung or between male and female frogs. The parasite prevalence for *Gorgoderia* was 50% and the mean parasite intensity was 0.66, with the parasite prevalence in female frogs being significantly higher than in the male frogs. In contrast to the infected lungs, no nematodes were found and no hemorrhaging or mucus were observed in the bladder. All the flukes were attached firmly to the bladder wall by their suckers. To determine if any significant damage to the frog's tissues resulted from the trematode infection, the histology of infected and uninfected lung and bladder tissues of *Rana pipiens* were compared. Results of this research revealed no significant damage to the infected tissues suggesting that *Haematoloechus* and *Gorgoderia*, as well *Rhabdias* have little histopathological effect on their amphibian host. \* Supported by South Carolina Independent Colleges and Universities

## VASCULAR PLANT DIVERSITY WITHIN THE MIDDENDORF BEDS

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The Middendorf beds of Eastern South Carolina contain a diverse fossilized assemblage of Upper Cretaceous (approx. 70 Ma) tracheophyte leaves, preserved as impressions or as mineral precipitate upon impressions. These beds are often regarded as part of the Black Creek Formation, which crops out in the inner Coastal Plain of North and South Carolina. Building on prior work, we collected, prepared, and identified over 40 species within these leaves. A rank-abundance from our specimens indicates the dominant species to be *Ficus atavina* closely followed by *Sequoia reichenbachii*. Both the Shannon-Weiner Index and Simpson's index show that the diversity within the Middendorf flora is comparable to that found in modern oak-hickory forests. Sørensen's Community Coefficient indicates that the flora within the Middendorf Beds and the typical flora of the Black Creek Formation represent different communities.

## LACTATE DEHYDROGENASE (LDH) ACTIVITY IN FLIGHT MUSCLE EXPOSED TO SIMULATED MICROGRAVITY

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and Timothy A. Mousseau

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Microgravity results in substantial changes in muscle function, consisting mainly of loss of muscle mass, force and power, increased muscle fatigability, and abnormal reflex patterns. The purpose of this research was to investigate possible effects of simulated microgravity on the process of flight muscle histolysis in the house cricket. An electrically powered, belt-driven, horizontal rotation (1–5 rpm) bench top clinostat was constructed. An extended horizontal shaft served as the platform to which experimental crickets were mounted. Intact dorsal longitudinal flight muscles (DLMs), portions of dorsal ventral muscles (DVMs) and hind-limb femoral muscles were excised after various duration of clinorotation and assayed for muscle shortening, total protein content and lactate dehydrogenase activity. Results suggest possible effects of simulated microgravity may include lessened muscle shortening and reduced mass accompanied by alterations in lactate dehydrogenase activity. This research was supported by SC-Life, SC-Space Grant Consortium, NSF-EPSCOR and NIH-RIMI (MD-00233).

## A PHENOTYPE-BASED SCREEN TO IDENTIFY NEGATIVE REGULATORS OF CONIDIATION IN *FUSARIUM GRAMINEARUM*

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*Fusarium graminearum* is an important fungal pathogen of small grains and maize cultivated throughout the world. This pathogen not only causes extensive crop losses due to the destructive nature of the disease but also has the ability to contaminate grains with mycotoxins. To better understand fungal development and its relationship with pathogenicity, we developed two phenotypic screens to identify random-insertional mutants of *F. graminearum* wild-type strain (PH-1) exhibiting gain-of-function phenotypes specific to asexual development. Our studies have revealed that PH-1 does

not produce asexual spores (macroconidia) when cultured for one week on solid, carboxymethylcellulose (CMC)-agar plates incubated in complete darkness at 22°C. Cultures incubated for the same period under identical conditions but exposed to continuous light produce abundant macroconidia (>10<sup>5</sup> conidia/cm<sup>2</sup> of plate area). Asexual development in this fungus is also repressed by high nitrogen availability. In an attempt to isolate genes involved in repression of asexual development, a library of over 4,000 tagged-insertional mutants of *F. graminearum* derived from restriction-enzyme mediated integration (REMI) mutagenesis of PH-1 will be subjected to two phenotypic screens. The first screen will identify mutants that gain the ability to produce macroconidia on solid CMC when incubated in continuous darkness. The second screen will identify mutants that gain the ability to produce macroconidia when cultured on complete medium in continuous light. The gain-of-function or suppressor mutants exhibiting abnormal developmental phenotypes compared to wild type will be characterized at a molecular level to determine the site of integration of the REMI plasmid, followed by complementation studies to confirm that the tagged mutation is responsible for the observed phenotype.

#### CHARACTERIZATION OF A POLYCISTRONIC TRANSCRIPT IN LB400

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The bph cluster in LB400 consists of at least 14 genes and is absolutely necessary for Biphenyl and Polychlorinated biphenyl (PCB) degradation. We have initiated an investigation into the transcription of bph genes in this unusual gram-negative bacterium. Previously, we were able to show that four genes (bphA, E, orf1, and bphF) are cotranscribed from a promoter located upstream of bphA called p1. The gene that follows bphF is called bphG. At this time we are examining the possibility that it is also present on the polycistronic transcript containing bphA and the others. Total RNA preparations were used in reverse transcription experiments with an oligonucleotide complementary to the 5' end of bphG. The resulting cDNAs were then tested via PCR using the original oligonucleotide and a second primer corresponding to sequences at the 3' end of bphF. Amplification of the region between bphF and G is a strong indicator that the polycistronic transcript initiated at p1 contains all of the genes between bphA and bphG. Since four of these genes encode the subunits of the enzyme Biphenyl dioxygenase, regulation of p1 could explain how the expression of this enzyme is controlled, and how the cell is able to ensure that all of the subunits are expressed at the same time.

#### BACTERIA ASSOCIATED WITH THE CORAL ECHINOPORA IN THE INDIAN OCEAN

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Diseases are now known to have significant effects on the health of coral reefs throughout the world's oceans. The number of recognized coral diseases has increased dramatically due to increased global monitoring. These diseases represent a serious concern about the health and future of coral reef communities. One of the most common disease signs is a loss of tissue followed by necrosis. This disease/syndrome has been referred to as white plague, and has been observed in all oceans. The pathogens associated with these disease signs depend on the location of the corals. In the Caribbean, the disease was associated with *Aurantimonas coralicida* and in the Red Sea with *Thalassomonas loyaeana*, both newly described species.

During an exploratory survey of reefs near Zanzibar in the Indian Ocean, mucus samples of an apparently diseased (with signs of white plague) and healthy *Echinopora* were collected and plated on GASW and TCBS. Growth on TCBS was only found with diseased samples. In all, about 600 bacterial strains were isolated from diseased *Echinopora* coral samples compared to 200 from healthy coral samples. Using commercially available Biolog plates, the metabolic diversity of the bacterial community was characterized. A relatively high prevalence of Class Gamma Proteobacteria was recorded in diseased *Echinopora* samples compared with healthy coral samples. Among the significant findings, various *Vibrio* species were well represented in diseased coral samples.

#### ALTERNATIVE COLLECTION PROTOCOL FOR SEMEN ANALYSIS: OVERNIGHT SEMEN COLLECTION KIT

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The semen analysis continues to be a preliminary clinical test for male infertility, but many men find it difficult to collect a semen sample in the clinical setting due to societal factors or geographic constraints. Thus, delays in obtainment of a semen analysis can become the limiting factor in the physician's quest to determine the cause of a couple's infertility. In order to alleviate the stress involved in collection of a semen sample in the office, we propose a home collection procedure. This study mimics the situation in which the men would receive a collection kit, collect a sample at home, and overnight the package to the laboratory for analysis. The study objectives were to development algorithms to predict a semen sample's concentration and motility at the time of collection. Semen samples for this study were obtained from 48 men presenting to our practice for a semen analysis. Samples were collected by masturbation after at least 48 hours of sexual abstinence. An initial semen analysis was performed with concentration and motility calculated using a Hamilton Thorne IVOS Sperm Analyzer (Beverly, MA). During this process, 1 mL of test yolk buffer (TYB) with gentamicin (Irvine Scientific, Santa Ana, CA) was warmed to room temperature in a 2095 Falcon conical tube. After the initial semen analysis was concluded, 1 mL of the raw ejaculate was added to the 1 mL of TYB (test sample). The test sample was vortexed and placed in a refrigerator at 2°-8°C for approximately 24 hours. This refrigeration period and time lapse was arranged to mimic the shipping process. For the next day analysis, the conical tube with the test sample was placed into a 36.7°C water bath and incubated for one hour. After incubation, the sample was vortexed and analyzed for concentration and motility parameters. The average concentration and motility for the pre- and post-analyses were  $48.9 \pm 42.4$  million sperm per mL with 59% motility versus  $38.1 \pm 34.0$  million sperm per mL with 37% motility, respectively. Linear regression analysis for predicting a pre-concentration value using the post-concentration value produced an equation of  $1.2 \times \text{post-concentration} + 3.9$  ( $r^2 = 0.9$ ). Linear regression analysis for predicting a pre-motility value using the post-motility value produced an equation of  $0.5 \times \text{post-motility} + 38.2$  ( $r^2 = 0.4$ ). The aim of this study was to provide an alternative option for semen collection among men faced with geographical dilemmas or societal constraints. Data obtained from this study indicate the concentration algorithm has a high degree of accuracy, while the motility algorithm should be used with caution. However, these preliminary results provide some insight into whether home collection procedure is a viable option for initial semen analysis testing.



DETERMINATION OF OPTICAL PROPERTIES OF PHOTSENSITIZED TISSUE  
PHANTOM

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The long-term goal of our research is to optimize light dosimetry for esophageal photodynamic therapy. We have developed a cylindrical Monte Carlo program that simulates light absorption in the multilayered esophagus. The Monte Carlo method requires accurate absorption and scattering coefficients in order to predict the depth of necrosis that is expected for a given light dose. There is currently very little information in the literature about the optical properties of photosensitized tissues. The objective of this project is to determine how the optical properties of a tissue phantom change with the addition of known amounts of porfimer sodium. The tissue phantom is composed of bovine blood, intralipid and saline with various amounts of porfimer sodium. Diffuse reflectance and transmittance are measured with an integrating sphere spectrophotometer. Absorption and reduced scattering coefficients are determined with the inverse adding doubling method. Preliminary results will be presented along with a discussion of their contribution to the overall project.

METAL SPECIFICITY OF THE RIBONUCLEOTIDE REDUCTASE FROM  
*CORYNEFORMAMMONIAGENES*

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The metalloenzyme ribonucleotide reductase (RNR) catalyzes the conversion of ribonucleotides to deoxyribonucleotides, the monomeric components that are incorporated into DNA. The enzyme's prominent role in DNA synthesis makes it an ideal anticancer, antiviral and antibacterial drug target. The RNR of higher organisms utilizes the reactivity of a Fe(II)/Fe(II) cluster with oxygen to oxidize a tyrosine residue to a tyrosyl radical and a diferric cluster cofactor. Research in our laboratory suggests that Coryneform bacteria may instead be utilizing a manganese cofactor to catalyze the same reaction. However, the gene sequence of the RNR from *C. ammoniagenes* (CA) suggests that the enzyme may be a modified iron enzyme, similar to the RNRs of some human pathogens. Our objective is to define the metal specificity of the RNR from *C. ammoniagenes*. If the tyrosyl radical in the *C. ammoniagenes* enzyme is formed by the reaction of a Mn(II)/Mn(II) center with oxygen, then this will be the first demonstration of "oxygen activation" by a manganese enzyme. If we demonstrate that the enzyme can utilize either Mn or Fe to generate its radical, then this is a striking difference between bacterial RNRs and the human RNR. Such a difference makes RNR an even more attractive drug target. Our work is focused on optimizing conditions to generate the active radical/metal cofactor in CA-RNR. In particular, we are very interested in the role of an ancillary protein called nrdI that may be responsible for enhancing RNR activity in this type of bacteria. \* Supported by NIH-AREA R15 GM067690-01

INTERNET USE FOR MEDICAL PURPOSES

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There are several types of internet. There is what is known as Broadband Internet Access. Broadband is the most common high-speed Internet connection. Broadband is a high

speed Internet connection that gives you access to the Internet up to fifty times faster than a traditional dial-up connection. Downloading is done at unbelievable speeds and Web Pages can be accessed immediately. Broadband is a technique that uses several different distinct channels that can be used concurrently to transmit large amounts of data over an extensive distance. These individual channels are secluded from each other by guard channels of unused frequencies. A broadband network can operate at speeds of up to twenty megabits per second and is based on the same technology used by cable television. Broadband comes in two types. There is Cable Broadband which is Broadband internet access through a cable line. This does not interfere with your television. DSL (Digital Subscriber Line) also offers broadband service over ordinary copper telephone lines. Likewise with the cable Broadband, the telephone is not affected by the sharing of the space. DSL itself is broken down into sub classes. Satellite is considered "broadband" because of the amount of data it carries in the time it takes to carry it. WiFi (wireless fidelity) is a form of wireless high speed internet access. WiFi is also commonly known as wireless networking or an 802.11 network. Dial up is still the most common form of internet access.

The internet has the potential of helping all Americans deal with healthcare. They're problems that have to be solved before it is as effective as it is capable of being. Changes have be made regarding the type of internet people have, the number of people that have internet access across all demographic spectrums must increase and improvement of foreign language healthcare web sites, as well.

#### HEALTH ASSESSMENT OF WOMEN LIVING WITH AIDS IN KENYA

**Ashlee Riggs**, Pearl Fernandes, John Mecham<sup>1</sup>, and Michael Otieno<sup>2</sup>

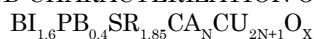
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A multi-institutional collaboration was established to study the effects of nutrition, socioeconomic status, and cultural factors in the susceptibility to HIV and progression from HIV to AIDS among women in rural Kenya. The study was conducted in the summer of 2006 in Gatundu, a district with one of the highest rates of HIV/AIDS. Faculty and students from Kenyatta University and community workers selected the study site, obtained participants, and translated data. Fifteen women with HIV/AIDS and 15 controls were studied. HIV tests and CD4+ counts were conducted. The survey included questions on education, social practices, nutrition, 24-hour dietary recall, and anthropometric indices. HIV tests confirmed that women in the experimental group, aged 27-60 years old, were HIV positive with average CD4+ counts of less than 300. More women in the experimental group were in polygamous marriages or single and had a lower percentage of contraceptive use. Forty percent reported not using anti-retroviral drugs due to lack of access to health care facilities. Lack of food contributed to feeding problems in the women. Eighty seven percent of the women reported that the disease affected their physical and mental health. Dietary survey results indicated that the caloric and protein intake were inadequate.

## SYNTHESIS AND CHARACTERIZATION OF MULTILAYER



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A modified solid-state reaction is used to synthesize multi-layer bismuth high T<sub>c</sub> superconductors  $\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_{1.85}\text{Ca}_n\text{Cu}_{2n+1}\text{O}_x$ . The number of Ca layers ranged from n=2 to n=6. The resulting ceramic materials were investigated by electron microscopy (SEM) and EDAX and were tested for superconducting transitions. Transport properties were characterized with a four-probe method. Influence of synthesis on the temperature dependant behavior of electrical conductivity and superconductivity will be reported.

## EFFECTS OF 17BETA-ESTRADIOL AND TAMOXIFEN ON CELL CYCLE DISTRIBUTION AND ESTROGEN RECEPTOR-ALPHA EXPRESSION IN MCF-7 CELLS

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Estrogens are hormones that function as signaling molecules and act on target tissues by binding to the estrogen receptors (ER). Tamoxifen (TAM), a nonsteroidal triphenyl ethylene has structural conformation such that it resembles steroidal molecules located within the nucleus. It is therefore able to bind to the ER and thereby acting as a competitive inhibitor to estradiol. In this study we have examined the effects of TAM and 17beta-estradiol ( $E_2$ ) on estrogen responsive human breast cancer MCF-7 cells. We have employed Vindelov's propidium iodide solution for cell cycle analysis by flow-cytometry. Because propidium iodide binds stoichiometrically, the fluorescent intensity of stained cells offers a direct measure of cellular DNA content that reflects the stage of the cell cycle. We prepared a single cell suspension in ice-cold, stain-detergent solution and analyzed the cell cycle distribution following treatment with varying concentrations of TAM and  $E_2$ . After 24-hour treatment TAM  $10^{-4}$  M significantly decreased MCF-7 cells at the  $G_0/G_1$ , S and  $G_2/M$  phases when compared to the control.  $E_2$   $10^{-4}$  M decreased the proportion of cells in the S phase but increased cells in  $G_2/M$  phase at both 24 and 48 hours of treatment. After 48 hours TAM  $10^{-4}$  M, and  $E_2$   $10^{-4}$  M + TAM  $10^{-4}$  M both appeared to exert a blockade at all three phases of MCF-7 cell cycle. Localization of ER-alpha was examined by immunocytochemistry. Ninety percent of cells with both TAM  $10^{-4}$  M and  $E_2$   $10^{-4}$  M + TAM  $10^{-4}$  M treatments appeared immunopositive and were significantly different when compared to the control groups. These data suggest that tamoxifen on MCF-7 cells is growth inhibitory, cell cycle perturbing and apoptotic, whereas natural estrogen does not share all of these responses. In addition, tamoxifen is a more successful competitor for the ER-alpha. \*Supported by grants from NIH MD00233, HD38342, GM068627 and INBRE Award #P20 RR16461 (EPSCoR/CRP)

## ASSESSING THE BIOLOGICAL ACTIVITY OF DOWNY RATTLESNAKE PLANTAIN (*GOODYERA PUBESCENS*)

**Robert Lee Sanders** and Jane Ellis

Department of Biology, Presbyterian College

The native orchid Downy Rattlesnake Plantain (*Goodyera pubescens*) has been used by American Indians tribes to treat blood, digestion, and kidney problems, gynecological pain, toothaches, rheumatism, and as an antidote for snakebites. This paper will discuss the results of various bioassays performed on *G. pubescens* leaf and rhizome extracts in order to determine the presence of medicinal activity. In preliminary antitumor tests

using *Agrobacterium tumefaciens* there was a reduction in tumor numbers. Inhibition of cell proliferation in the MCF-7 human breast cancer line was determined by the MTS assay. Investigation results using the plant extracts in competitive binding assays with human recombinant estrogen receptor b indicated low estrogenic activity in both leaves and rhizomes.

#### ANALYSIS OF LB400 CHROMOSOMAL DELETIONS

**Tyesha Sanders** and James Yates  
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The gram-negative bacterium called LB400 has been identified as *Burkholderia xenovorans*. This organism is somewhat unusual in that it has three chromosomes ranging in size from 1.47Mb to 4.9Mb. The bph cluster encodes enzymes required for biphenyl and PCB metabolism. This cluster is located on the smallest chromosome and is flanked by two copies of the insertion sequence IS1071. Growth of LB400 on substrates other than biphenyl results in the appearance of spontaneous mutants (called LS mutants). We previously utilized Southern blots to show that part (or all) of the bph cluster has been deleted in these mutants. We are attempting to use PCR to identify the extent of the deleted region in a mutant called LS2. Oligonucleotides corresponding to regions located upstream and downstream of the two IS1071 sequences were designed and PCR was used to amplify total DNA preparations from LS2 and LB400. In addition, oligonucleotides corresponding to sequences within IS1071 were designed and combined with the oligos described above to further clarify the extent of the deletion in the LS2 mutant.

#### EFFECTS OF PROTEASOME INHIBITION ON PROTEIN EXPRESSION IN BREAST CANCER

**Yanille Scott**, Anna-Lee Clarke, Ebony Maxwell and Rush H. Oliver  
Dept. of Biology, Chemistry and Environmental Health Sciences, Benedict College,

Treatments with the proteasome inhibitor MG-132 induce a G2/M cell cycle arrest in breast cancer cells. We have used immunochemistry with antibodies directed against proteins involved in cell cycle progression to investigate the mechanism underlying this response. Epifluorescent microscopy of MCF-7 breast cancer cells reveal that the G2/M arrest is unlikely to be caused by metaphase arrest since there are fewer mitotic spindle formations observe red in cells treated with MG-132 than controls treated with estrogen or tamoxifen. Inhibition of the proteasome is accompanied by an accumulation of ubiquitin-conjugated proteins as demonstrated by Western-blotting and ELISA. A survey of cyclins, cyclin-dependent kinases and other cell cycle regulators suggest levels of these proteins are affected by proteasome inhibition. Further studies are necessary to identify specific proteins involved in G2/M arrest caused by inhibition of the proteasome. This research was supported by SC-Life, SCICU, SC-AMP and NIH-RIMI (MD 00233).

#### IMAGES OF FEMALE PROFESSIONAL SCIENTISTS

**Allison Serdah**, Jane Ellis, and Anita Dutrow<sup>1</sup>  
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Studies show that a majority of girls lose interest in science and in becoming scientists by their teen years. In 1981 Martin and Halverson suggested that boys and girls are socialized into their roles by their perceptions of the world. This is known as the gender schema theory. Schemas can be molded by authority figures such as parents, teachers,

friends, peers, and also media like books, magazines, television and music. The purpose of this study was to determine what perceptions are being molded into the minds of young adolescents about women in the field of science. A three-page questionnaire was composed covering entertainment choices, books read, favorite television shows, stereotypes involving scientists, the students' perception of science and their own ability and interest in the sciences. Over one hundred male and female sixth and eighth grade students from rural and urban communities completed this survey. Eighty-five percent of the females completing the survey thought that they could become a scientist, yet eighty-four percent said that they had no interest in a career in the science field. Seventy-five percent of the male respondents believed that they could become a scientist, but they were not interested in a career in science. The survey revealed that the number one way children actually view or observe scientists is through television with school following second. Overall, sixty-three percent of males and fifty-two percent of females confirmed that males were more likely to be scientists, but generally the students thought that a scientist could come any gender, or ethnic background.

PROS AND CONS OF COMBINING DATA FROM TWO TELESCOPES TO AID IN  
FREQUENCY DETERMINATION OF PULSATING STARS

**Melissa L. Sims** and Robert J. Dukes Jr.

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This project is a comparison of several studies done on the variable star HD21071, which was previously determined to be a Slowly Pulsating B star by Waelkens, et. al. (*Astron. Astrophys.* 330, 215-221, 1998) with a suggested period of .841 day (1.19 c/d). Several later studies including Mills, L. R., et. al. (*BAAS* 31, 1482, 1999) and Andrews, J. E., et. al. (*AAS Meeting* 203, #83.14, 2003) confirmed the .841 period and tentatively suggested other possible periods based on new data, including 0.704 day (1.42 c/d), 0.775 day (1.29 c/d), and 1.14 day (0.878 c/d) periods.

This project merges Geneva V data and data from the y filter from the FCAPT data in the Stromgren *uvby* system by using a bilinear transformation from Harmanec et. al. (*Astron. Astrophys.* 369, 1140, 2001). Frequencies were determined using the Period04 program, which utilizes a least square fitting technique, to determine frequencies in the two data sets separately. We then analyzed the merged data set resulting in confirmation of the periods found in the individual data sets. The reality of these frequencies was tested using multiple methods including least squares analysis and a check of the signal to noise ratio.

We found that the merged data set provided no better results in terms of the signal to noise ratios of the frequencies found than the individual data sets. However, comparing results from the two data sets did provide a strong indication of the reality of the frequencies found since the two sets were completely independent (different telescopes, different locations, different observing times and different filter sets).

We would like to thank Connie Aerts and Peter De Cat for providing the Geneva data as well as a copy of their preliminary analysis of this data. This work has been supported by NSF Grant AST-0071260 & AST-050755

### SALINITY AFFECTING GARDENIA CUTTINGS

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The current investigation dealing with Gardenia stem cuttings was inspired by the rooting of Gardenia cuttings in tap water. In this investigation the tolerance of Gardenia plants against salinity was tested. The economic justification for this investigation was to increase Gardenia sales in beach areas of South Carolina where the salinity level soil is relatively high. Stems were cut 6 inches long with five healthy leaves that ranged from 7-9cm long, and the end of the cuttings were slant cut at 45 degrees. The saline solutions with various molarities ranging from 0.2-0.8 moles were prepared by proportional dilutions from 1.0M stock solutions. In each saline concentration ten cuttings were placed in beakers containing saline depth of 1 inch. The survival of the plants in high salt concentrations determines the tolerance of the Gardenia cuttings against salinity. In salt concentrations between 0.2-0.5 moles the plant that survived the longest maintained their natural medium green color. On the other hand in 0.6-0.8 moles, the few plants that survived turned brown and died. The plants that died were discarded. No rooting occurred except in the tap water control.

### CONTAMINATION OF LICORICE AND GINGER ROOT HERBAL PRODUCTS

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Licorice root and ginger root herbal products were investigated for bacterial contamination and biological activity. Licorice root has been reported to have estrogenic activity and exhibits many pharmacological activities such as anti-tumoral, anti-trichomonas, anti-inflammatory, anti-allergenic, anti-toxic, anti-tussive, and anti-convulsive. Ginger root extracts have been extensively studied for a broad range of biological activities including antibacterial, anticonvulsant, analgesic, antiulcer, gastric antisecretory, antitumor, antifungal, antispasmodic, anti-allergenic, and other activities. Samples were plated on tryptic soy broth agar (general bacteria), Nash Snyder agar (*Fusarium*), and MacConkey agar (enteric bacteria). Ginger samples had minimal bacterial and fungal contamination. Licorice root samples showed substantial bacterial contamination. In the actual licorice root there were  $8.85 \times 10^4$  bacteria per gram of material, in the licorice stick there were  $6.11 \times 10^4$  gram of material. Ginger had  $2.30 \times 10^4$  of fungal colonies per gram of material. Upon analysis of these bacteria using gas chromatography fatty acid analysis, *Yersinia frederiksenii*, *Enterobacter agglomerans*, *Enterobacter cloacae*, *Kluyvera ascorbata*, *Clavibacter michiganese*, *Shigella dysenteriae* homologous to *E. coli*, *Bacillus pumilus*, *cereus*, *thuringense kurstakii*, *megaterium*, and *Cedecea davisae* were identified. A majority of the bacteria identified were enteric bacteria which can be responsible for various gastrointestinal infections and would be a serious concern to the general population taking these products. Further testing is being conducted to confirm the identity of these possible human pathogen and to investigate the biological activity of these herbal products.

HURRICANES AND THE COLLAPSE OF THE SOUTH CAROLINA RICE  
CULTURE

**J. Everett Spell** and Martha M. Griffin  
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A study was undertaken to address the impact of the numerous tropical cyclones which contributed to the collapse of the rice culture in South Carolina. Hurricanes were almost unknown to the British colonists settling the Carolina coast in the 1700's. In the 1730's there was a great influx of slaves from West Africa, where rice growing had been practiced since 1500 BC. Development of the tidal flooding method of rice cultivation in the 1730's and its perfection by 1750 made South Carolina a center of rice production. Over the next century numerous African slaves were lost to hurricanes. This labor, readily replaced, generated the great wealth of the rice plantations. After a setback in production during the Civil War, the rice culture slowly recovered until the 1890's. Between 1893 and 1913, six violent storms and unusual spring flooding led to the complete collapse of the once thriving rice culture.

A PRELIMINARY STUDY OF THE VASCULAR FLORA AT CAPE HENLOPEN  
STATE PARK, DELAWARE

**R. Stalter**, M.H. Choo, O. Galeano, G. Grigoryan, N. Faqueer, E. Lamont, and T. Mujo  
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The objective of the present preliminary study was to document the vascular flora at coastal Cape Henlopen State Park, Delaware. Monthly trips were made to the park during the growing season of 2006 beginning in April, terminating November 2, 2006. Over 300 specimens were collected, mounted on herbarium paper, labelled and will eventually be deposited in the Batson Herbarium, USC. The preliminary list of the vascular flora includes 283 species in 217 genera in 88 families. Non-native species composed 22% of the park's flora. Families with the greatest number of vascular plant species were the Poaceae and Asteraceae with 37 and 34 species respectively. Genera with the greatest number of species were *Carex* (8) and *Juncus* (7). Plant families composed exclusively of non-native species were the Commelinaceae, Elaeagnaceae, Liliaceae, Molluginaceae and Oleaceae.

SEED PRODUCTION OF *SPARTINA ALTERNIFLORA* IN TWO SALT MARSHES,  
QUEENS COUNTY, NEW YORK

**R. Stalter**, M.H. Choo, M. Byer, N. Patel, H.Y. Vu, J. Soto and P. Nguyen  
Dept. of Biology, St John's University

The objective of the present study was to determine seed production of *Spartina alterniflora* in two Queens County, New York salt marshes. The sites selected for study were APEC in northern Queens and Jamaica Bay Wildlife Refuge in southern Queens, County New York. Culms (stems) of *S. alterniflora* were harvested from sixteen 0.25m<sup>2</sup> quadrats at each site. Seeds were removed from the culms, counted and expressed as number of seeds/m<sup>2</sup>. The average number of seeds/m<sup>2</sup> at APEC was 10,000 while the average number of seeds/m<sup>2</sup> at the Jamaica Bay site was 15,300. In separate studies Stalter determined viable seed production of *S. alterniflora* at Georgetown and Charleston, South Carolina salt marshes and at Stonington, CT. The percentage of viable seeds was 9% for 2,250 seeds tested at Georgetown, 8% for 500 seeds tested at Charleston, South

Carolina and 12% for 500 seeds tested at Stonington. Although only about 10% of the *S. alterniflora* seeds in a given growing season may be viable, the total number of viable *S. alterniflora* seeds may exceed 107/hectare.

THE VASCULAR FLORA AT SMALL DISTURBED SIDEWALK PLOTS,  
BROOKLYN, NEW YORK

**R. Stalter**, A. Batool, M.H. Choo, G. Grigoryan, and S. Truc  
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The primary objective of the present study was to determine the vascular plant species present in 30 small plots ranging in size from 0.78 to 17.8m<sup>2</sup>. The total area of all thirty plots was 132.8 m<sup>2</sup>. A second objective was to determine the region of origin of the non-native plant species identified in the study. The vascular plant species in thirty small sidewalk plots, Brooklyn, New York, were sampled in October, 2006. Eleven of the thirty plots were planted by local residents; none of their garden species were included in this survey. Sixty species within 47 genera in 29 families were identified. The Asteraceae and Poaceae, each with 10 species, were the largest families in the flora. Thirty five species, 58% of the flora, were not native to the region. Europe (11 species) and Eurasia (9 species) contributed the largest number of non- native species while Africa and Australia contributed none.

SYNTHESIS OF A NEW DERIVATIVE OF THE ANTIBIOTIC CYTOSPORONE E:  
THE BEGINNING OF A SAR STUDY

**Michael Stephens** and Justin K. Wyatt  
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The antibiotic cytosporone E was isolated in 2000 and found to have weak antibiotic activity, and has recently been found to have only activity against gram-positive bacteria. The apparent business end of the phthalide contains three phenolic moieties, where the central moiety is need for antibiotic activity. To determine if this group is need for space filling reasons we are designing an analog that replaces this central hydroxy group with a methyl group. \*Supported by NIH SC-INBRE Grant # P20 RR-016461

17-BETA HYDROXYSTEROID DEHYDROGENASE ACTIVITY IN THE CORPORA  
LUTEA OF PREGNANT PIGS.

**Samuel L. Strachan** and Rush H. Oliver  
Dept. of Biology, Chemistry and Environmental Health Sciences, Benedict College

Alterations in the patterns of steroidogenesis in the ovary are crucial to reproductive development in humans and other mammals. Estrogens, progestins and androgens are synthesized from cholesterol precursors by the activity of enzymes present in the follicle cells of the ovary. The 17 $\beta$ -hydroxysteroid dehydrogenases (17 $\beta$ -HSDs) comprise a family of enzymes that catalyze the redox reactions necessary to convert estrogens and androgens at the C17 position. 17 $\beta$ -HSD plays a pivotal role in controlling steroid response through interconversion of steroid hormones such as from estrogen to estrone. We have assayed the activity of 17 $\beta$ -HSD in the corpora lutea (CL) from pregnant pigs using a radiochemical assay. Results indicate that CL of pregnancy contain significantly higher levels of 17 $\beta$ -HSD activity than is found in CL of non-pregnant pigs. This research was supported by SCICU, SC-Life, SC-INBRE-NSF/EPSCOR and NIH-RIMI (MD 00233).



DR. G.C. MANCE AND THE HISTORY OF THE  
SOUTH CAROLINA ACADEMY OF SCIENCE

**David J. Stroup**  
Francis Marion University

The South Carolina Academy of Science (SCAS) was organized in 1924 under the direction of Dr. G.C. Mance, Professor of Geology at Winthrop College. In 1927, the academy affiliated with the American Association for the Advancement of Science. Publication of the Bulletin of the Academy began, and in 1973 the SCAS Newsletter was established as a vehicle for communication among members. Beginning in the 1960s, industry and business joined academic institutions in support of the Academy and have helped to set goals to aid and improve the development of science in South Carolina. The South Carolina Junior Academy of Science was founded by Dr. John Michner in 1969 and the Middle School/Elementary School Academy was founded by Dr. Don Jordan in 1991. The first issue of the peer reviewed, electronic, Journal of the South Carolina Academy of Science was published in the Fall of 2003. The Academy is dedicated to raising the level of science education in South Carolina and to promoting research and the transmission of knowledge within the State. The Academy of Science is the only statewide interdisciplinary science organization whose membership includes high school students, teachers and administrators, college students, professors, scientists, related professionals, parents of students, college presidents, business executives, small and large businesses, financial institutions, and institutions of higher education. One reason for this broad spectrum of support for the Academy is that individually and collectively, members share a deep commitment to promote research and to stimulate the creative abilities of senior scientists and the youth of our State.

ANALYSIS OF BLOOD ON SUBSTRATES OF FORENSIC RELEVANCE BY  
FOURIER-TRANSFORM INFRARED (FT-IR) SPECTROSCOPY

**Heather Taylor**  
USC Columbia

Blood is an informative and critical piece of evidence discovered at crime scenes found on a variety of matrices including clothing, carpets, wood, and stone. A spectroscopic method of analysis would be an improvement to the existing chemically based detection methods, reducing analysis time, false positives and eliminating potentially toxic effects from chemicals. This research will investigate the use of FT-IR spectroscopy to detect blood on various matrices and forensic use of this ability.

Replicate infrared spectra of various neat and bloodstained substrates were collected using a Nexus 670 FT-IR (Thermo Electron, Madison WI) utilizing a Smart DuraSamplIR attenuated total reflectance accessory. The collection of substrates was compiled of polymers made of olefin, nylon, and polyester that were coated with Scotchguard™ and other stain release protectors, all frequently encountered at crime scenes.

Discrimination of the bloodstained substrates compared to the polymer alone was achieved for the majority of the samples through visual inspection. The hemoglobin, the predominant protein found in blood, produces distinctive strong bands in the infrared region, observed as a doublet in the 1500-1600  $\text{cm}^{-1}$  range. However, the nylon polymer, which is commonly used in carpet production, also produces the same amide I and amide II bands observed in the IR spectrum of blood. This interference complicates the determination of blood's presence. The use of multivariate statistical analysis allows for greater discriminating ability between spectra with similar features. This presentation will discuss the methods used for sample preparation, data collection and spectral interpretation.

USING A WATER EFFECTS RATIO METHOD TO DETERMINE IF OUTFLOW  
FROM A MATURE CONSTRUCTED WETLAND WILL CHANGE THE  
BIOAVAILABILITY OF COPPER TO *CERIODAPHNIA DUBIA*

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Guidelines established by the US Environmental Protection Agency regulate the amount of copper and other metals that can be released into riverine systems by public and private facilities. Prior studies indicate that both suspended and dissolved organic constituents present in riverine systems can chelate metal ions, and significantly reduce their bioavailability to surrounding organisms. Because of these complex chemical interactions, simple analytical chemistry techniques do not accurately reflect metals toxicity to aquatic organisms. Water Effects Ratios (WERs) have been proposed as a possible method for evaluating the actual levels of bioavailable metals and the maximum amount of metals that a given system can sustain without resulting in adverse effects on the surrounding aquatic biota. This type of study compares the toxic effect of a metal added to laboratory water and that same metal added to water collected from a natural receiving stream, then uses that data to calculate a correction factor to adjust the regulatory standard. Our study examined the outflow from an eight-year-old constructed wetland to determine if the added organic constituents typical of this wetland would transform copper into a less toxic form. Standard 48-hour acute toxicity tests were performed using *Ceriodaphnia dubia*. Mortality was the endpoint, and data are expressed as the concentration of copper lethal to 50% of the exposed test organisms (i.e., the LC50). The following four water types were spiked with copper: soft laboratory reconstituted water, moderately hard reconstituted laboratory water, wetland outflow, and wetland outflow filtered through a 0.45 micron membrane. Preliminary results indicate that LC50 values were higher in filtered and unfiltered copper-spiked wetland outflow (9.38 ppb Cu and > 12.5 ppb Cu, respectively) than for soft laboratory reconstituted water (LC50 < 0.78 ppb Cu). The LC50 for copper in moderately hard water was 10.9 ppb. This indicates that water flowing out of the wetland does ameliorate some of the effects of copper toxicity. Results also signify that both dissolved and suspended organic constituents play a vital in the transformation of copper ions to a less toxic form.

THE EFFECTS OF 3-METHYL ADENINE DNA GLYCOSYLASE (3-MEA) IN 54  
WILD TYPE (WT) COMPARED WITH  $\Delta 12$  WT AND  $\Delta 54E125Q$  TREATED WITH  
METHYL METHANE SULFONATE (MMS) ACTING AS A BASE EXCISION  
REPAIR PATHWAY

**Ciera Thomas** and Michael Wyatt  
South Carolina Cancer Center and Claflin University

A protection of bacterial cells from toxicity is the role of 3-Methyl adenine DNA Glycosylase (3-MeA). It acts as a barrier that prevents the production of mutagenic damage that can be made by a DNA polymerase. As a part of helping to pair nucleotide bases, the DNA polymerase is capable of errors due to the resemblance of a correct nucleotide base that pairs with another nucleotide base match creating mutations. In using bacterial cells,  $\Delta 54$  wild type (wt) and  $\Delta 12$  wt contain normal glycosylase activity that is found in the body while  $\Delta 54E125Q$  is a type of bacterium that has no glycosylase activity not found in the body. In this study, bacterial cells  $\Delta 54$  wt,  $\Delta 12$  wt and  $\Delta 54E125Q$  are treated with 1 micro liter ( $\mu$ l) of Methyl Methane Sulfonate (MMS). A control group without MMS treatment containing  $\Delta 54$  wt,  $\Delta 12$  wt and  $\Delta 54E125Q$  bacterial cells are compared with the previous MMS treated bacterial cells. From the control group of MMS and MMS treated bacterial cells, the survival of cell colony formation was recorded. Results showed

MMS treatment of  $\Delta 54$  wt compared with  $\Delta 12$  wt bacterial cell colonies were more prominent in survival. Compared with  $\Delta 54E125Q$ ,  $\Delta 54$  wt cell survival colonies were fewer (33) than  $\Delta 54E125Q$  (44).  $\Delta 54E125Q$  as a mutated version of  $\Delta 54$  wt persisted over the cell survival colonies of  $\Delta 54$  wt. With  $\Delta 54$  wt having glycosylase activity,  $\Delta 54E125Q$  is without the glycosylase activity source of protection from chemical agents, such as MMS. The initiation of the base excision repair pathway (BER) that results from glycosylase activity was found in small amount of cell colonies  $\Delta 54$  wt but in large amounts of  $\Delta 54E125Q$ . Therefore,  $\Delta 54E125Q$  has become an anti resistance to MMS being able to produce more mutagenic agents acting in the path of cancer.

#### LONGITUDINAL ANALYSIS OF VICTIMIZATION AND PROBLEM ALCOHOL USE IN ADOLESCENTS

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Research indicates that alcohol use is both a risk factor for, and a consequence of, violent victimization. This study investigated the longitudinal associations between alcohol use and victimization, and if these associations varied by gender. Data from the National Longitudinal Study on Adolescent Health (Add Health), a nationally-representative sample of boys and girls, were used to investigate the prospective associations between alcohol use and victimization over three time points spanning 7 years. Because adolescence is a time of rapid growth, we used latent growth modeling (LGM) in addition to traditional cross-lagged structural equation modeling (SEM). For boys, results from both SEM and LGM indicated that alcohol use was a risk factor for victimization. For girls, SEM results suggested a bi-directional association, although LGM results provided stronger support for alcohol use as a risk factor for, rather than a consequence of victimization. Findings across the two statistical approaches are discussed and implications for future research and preventive interventions are discussed.

#### SOME NEWSPAPERS IN AMERICA ARE “GETTING IT”—SWITCHING FROM NEWS AND INFORMATION AS LECTURE TO CONVERSATION: INSIGHTS FROM JOURNALIST BLOGGERS ABOUT WHAT THEY DO, HOW THEY DO IT AND WHY

**Larry Timbs**

Dept. of Mass Communication, Winthrop University

Personal Weblogs—“blogs” or “online journal(s) comprised of links and postings in reverse chronological order”(Gillmor, 2006)—are increasingly becoming more prevalent. As of this writing (early 2007), for example, there are now tens of millions blogs on the Internet (no one seems to know how many exactly but many sources agree the number is growing exponentially each week) (Gillmor, 2006) (Romenesko, 2006) (Drudge, 2006) (Rosen, 2006). And possibly thousands of these bloggers work for America’s newspapers. Free from the space and geographical constraints of journalism, bloggers are changing the community conversation. Connecting with others, they link the press to valuable sources of information for readers. Bloggers are helping redefine the media landscape. Recently, for example, they have been on the front lines of disseminating information that changed the presidency (Monica Lewinsky and Bill Clinton in the late 90s); played a key role in covering the 2000 and 2004 Democratic and Republican national conventions; unearthed a story that tarnished the career of a network TV anchor (Dan Rather of CBS News in 2004); exposed governmental inadequacy in late 2005 in the aftermath of

Hurricane Katrina; and in October 2006 helped spark the resignation in disgrace of an incumbent congressman who made salacious passes electronically (and otherwise) with young pages in his employ (Schatz, 2006).

Whether you accept or reject blogging as legitimate journalism, few would disagree that bloggers are altering the relationship between newspapers and their readers. Bloggers, according to Friend, Challenger and McAdams—authors of the 2005 edition of *Contemporary Editing*—are “encouraging traditional newsrooms to expand the news conversation, to connect with readers and viewers in broader ways and on deeper levels than at any time in history.”

But what of the bloggers at newspapers who are also traditional reporters, photographers or editors? What effects, if any, are their newspaper-linked blogs having on readers? On circulation? On themselves as journalists? On the stories, photos or other assignments they undertake? The blogosphere, a relatively new phenomenon for U.S. newspapers, is growing, but what is it actually doing for or to these journalists, their papers and their audiences? How are the bloggers themselves—and those who supervise them at newspapers—being transformed as journalists?

My research explores these questions through interviews with journalists who have links on their newspapers’ Web sites. The bloggers work at newspapers in the Carolinas; no claim is made that what is learned from these journalists can be extrapolated (although one could suggest that there’s no reason why they would be unrepresentative of other journalist bloggers.) Generalizability of findings was not the goal of this research. The goal was to gain a depth of understanding from a few newspaper bloggers about what they do, why they do it and how. Thus this paper should be viewed as a start to exploring the art and science of journalist blogging. Others may probe more deeply, widely and scientifically this phenomenon.

#### A BREATH OF FRESHWATER: THE EFFECTS OF WASTE WATER EFFLUENT ON WATER QUALITY

**Dedrick Tribble**, Pearl R. Fernandes, Jeffrey Steinmetz  
Division of Science, Mathematics and Engineering, USC Sumter

The Pocotaligo River and Swamp is a blackwater river system with its headwaters in Sumter County, South Carolina. The Sumter Waste Water Treatment Plant adds 45 million liters/day of treated sewage into the Pocotaligo Swamp. We investigated the effects of effluents from the Waste Water Treatment Plant on various indicators of water quality, including: fecal coliform populations, and macro and micro invertebrates. Samples were taken from an upstream (control) site, a site at which the effluent is released, and one downstream site. The parameters we measured included biological indicators, physical measurements of temperature, total suspended solids, oxygen concentration, pH and flow rate. Our results indicate that there was no significant difference ( $p < 0.05$ ) in fecal coliforms between the upstream and downstream sites. Significant differences ( $p < 0.05$ ) in temperature and total suspended solids between upstream and downstream sites were observed. The effluent site contained a higher microinvertebrate population, mainly ciliates. In addition, the effluent site had significantly higher numbers of macroinvertebrates ( $p < 0.05$ ), when compared to the upstream and downstream site. This increase was driven primarily by more abundant damselflies and ostracods. The most downstream site also had the greatest number of stonefly species, a taxa particularly sensitive to pollution. Due to the low fecal coliform counts and presence of sensitive macroinvertebrates at sites below the wastewater treatment plant, we conclude that the treatment plant is having no significant impact on water quality of the Pocotaligo River and Swamp.

## ROLE OF CATALASE IN THE MORAXELLA CATARRHALIS OXIDATIVE STRESS RESPONSE

**Richard J. Wallace**, Johari Jordan, Randall H. Harris  
Claflin University

*Moraxella catarrhalis* is a gram-negative oxidase positive bacterium that is found in the microbiota of the nasal passage. *M. catarrhalis* use various enzymes to deal with oxidative stress. One of these enzymes is catalase (Kat) which converts hydrogen peroxide to water and oxygen. Our laboratory previously generated an *M. catarrhalis* kat mutant and determined that it was more sensitive to hydrogen peroxide. The purpose of this study was to further characterize the kat mutant by examining its sensitivity to paraquat, a superoxide generator and to determine if the mutant has any residual catalase activity. Using disk diffusion assays, the kat mutant was found to be as sensitive to the parent strain to paraquat suggesting that catalase was not involved in superoxide detoxification. In order to determine if the kat mutant possessed any residual catalase activity, gels that detected the enzymatic breakdown of hydrogen peroxide were performed. No activity was detected in the kat mutant whereas catalase activity was observed in the parent strain. These data indicate that only a single catalase gene is present in *M. catarrhalis*. Future experiments will determine if kat expression is increased in the presence of sub-lethal concentrations of hydrogen peroxide and if this response is controlled by the oxidative stress regulator, OxyR.

## RUSSIA' RAILROADS: LESSONS FROM AMERICA-PART 3 LESSONS LEARNED

**Clinton H. Whitehurst, Jr**

Strom Thurmond Institute, Clemson University

Earlier papers on Russia's railroads discussed/analyzed "Historical Background" and "Economic Development East of the Urals." Discussed here are not only lessons for Russia's railroads but also lessons for transport systems that complement the rail network. In 2007 the Russian economy is undergoing various "reforms" with no economic sector immune from policies that make "reform" the central issue. In this context transport infrastructure must compete not only for funds but also political attention. "Lessons Learned" will consider only government policies that impact Russia's transport systems. Included are: land grants as a means of funding transport projects, transportation monopolies and regulations to contain monopoly power, decision making and cost sharing at different levels of government, private sector efficiencies in transport management, competition among transport modes, and prioritizing transport projects. In 2007 Russia's political and economic systems are at a crossroad. If the centralization of political power continues, the lessons cited in this paper will have little application. If "reform" recognizes the positive aspects of market economics and decentralization of political power then lessons from American can be a valuable policy tool.

## HEART RATE VARIABILITY AS AN INDICATOR OF ACUTE STRESS USING THE STROOP TEST

**Jonathan R. Williams** and John B. Williams<sup>1</sup>

Science Dept., Midlands Technical College

<sup>1</sup>Dept. of Biological & Physical Sciences, SC State University

Heart Rate Variability (HRV) is an analytical approach to detect relative stress effects in an individual by using electrocardiogram (ECG) measurements. HRV describes alterations in heart rate beat to beat cycles and has been shown to be a good indicator of the relative influences of parasympathetic versus sympathetic nervous control of heart

activity. For a rested, healthy individual, a periodic variation between successive R waves is typical and identified as respiratory sinus arrhythmia (RSA). HRV analysis in rested individuals should reflect the activity of parasympathetic nervous control. In contrast, reduced HRV due to stress is described as an indicator of lowered parasympathetic activity and increased sympathetic nerve activity. HRV has been identified as a marker for both dynamic and cumulative stress loadings. Because stress loadings have been shown to be a contributing factor for increased risk of heart failure, HRV has been helpful in assessing cardiac risk. Reducing stress needs to be a lifelong process and our study investigated the relative effects of acute stress on HRV in healthy individuals. If the cumulative effects of acute stress on individuals can be lessened, longer term cardiac health may result. Stress impacts on HRV were evaluated on two different groups of individuals (Group 1: healthy college students and Group 2: a family) using the Stroop Test to stimulate mental stress. Control ECG data were first collected for five minutes with the subject resting comfortably. Next, ECG was measured while the subject attempted to read the Stroop Test of color-coded words for five minutes. The Stroop Test has been documented to stimulate acute mental stress and allowed a rapid comparison of control versus stress HRV. HRV was calculated using IWORX hardware and software that utilized a Fast Fourier transformation of the ECG to a HRV power spectrum. The two components of the power spectrum used in our analysis were the low frequency range (LF) controlled mainly by sympathetic activity and the high frequency range (HF) controlled mainly by parasympathetic activity. Initial results did not display consistent trends in elevated LF / HF ratios under Stroop Test effects. Our ongoing, expanded sampling is subdividing participant groups by survey responses for categories related to exercise, smoking, age, and sex.

COMPARATIVE EFFECTS OF SEA LEVEL RISE VERSUS MAJOR HURRICANE  
EVENTS ON THE DRAMATIC EROSION OF SAKONNET POINT, RHODE ISLAND

**John B. Williams**

Dept. of Biological & Physical Sciences, SC State University

Sakonnet Point, Rhode Island is a peninsular headland and the most seaward extension of Rhode Island near its border with Massachusetts. The headland geological structure is of granite outcrops with abundant glacial till and moraine sand deposition. The historical seaward extension of Sakonnet Point consisted of a ca 300 meter long peninsula of glacial till covered with large sand dunes. This prominent dune system marked the westward border of the Cape Cod glacial dune system and was a mapped coastal feature. My study utilized a nearly 100 year time series record of ground level and aerial photography combined with site-specific observations to investigate its near disappearance. During this time span, this coastal feature has been altered from a system of nearly fifteen foot high sand dunes to almost complete submergence at high tide. Historical sea level rise along this southern New England coast has been about 0.25 to 0.3 m over the last 100 years. This rate is less than sea level rise in South Carolina due to the opposing force of glacial rebound uplifting the land. Superimposed upon these gradual erosional forces of sea level rise have been catastrophic hurricane storm surge events. Sakonnet Point was nearly at ground zero for the 1938 category 4 hurricane and our photographic time series documents the major erosion from this event. Our results show that major storm damage to barrier dune systems can set the stage for sea level rise to produce rapid disappearance of coastal beach systems. With the expected acceleration of sea level rise due to global warming, this disappearance of Sakonnet Point serves as a model for coastal planners to head the warnings of time.

## TRANSCRIPTION OF BPHB AND BPHC IN LB400

**Steven Walker**, James Yates  
Dept. of Biology and Geology, USC Aiken

A strain of *Burkholderia xenovorans* called LB400 has been shown to use biphenyl as a sole carbon and energy source. In addition, this organism is capable of degrading many different Polychlorinated biphenyl (PCB) congeners. The genes encoding these catabolic enzymes are grouped together on a chromosome in a region called the bph cluster. The second and third enzymes in the biochemical pathway are encoded by bphB and bphC. These genes are adjacent to each other in the cluster and are located immediately downstream of the genes encoding subunits of the first enzyme of the pathway. Several years ago a fragment of DNA containing bphB and C was cloned into *E. coli* and the enzymes were expressed. It was unlikely that transcription of these genes was initiated at a plasmid promoter, and therefore it seemed possible that a promoter was present in the bph cluster. We have previously attempted to identify the LB400 promoter that drives transcription of bphB and C. In these experiments we were examining the possibility that bphB and C are cotranscribed. We used RT/PCR to determine if they are present on the same or different transcripts. In addition, similar types of experiments were conducted to determine if bphB and C are part of the polycistronic transcript encoding the subunits of Biphenyl dioxygenase.

## DIPHENYLACETIC ACID AMIDES: NEW INDICATORS FOR STRONG BASES

N. Willis, **L. Nesbit**, O. Sotola and D. Magnin  
Division of Natural Sciences and Mathematics, Morris College

Currently there are numerous methods for the titration of very strong bases including organolithium, organomagnesium and metalamide bases. Some of these methods include: titration using activated halogens and disulfides, titration with colored reversible charge transfer complexes, titration via single deprotonations to give colored anions, titration via double deprotonations to give colored anions, concentration determination via NMR, and titration via cleavage of metal-metal bonds. The majority of these methods work very well within restricted ranges generating the dilemma of which method is best for a given specific circumstance. This problem suggests the need for a method that provides excellent accuracy that spans a very wide range of structural- and metallo- diversity. We envisioned that real improvements could be forthcoming by modifying one of the existing titration methods. Previous work with indicators of very strong bases has demonstrated that color and acidity modulation can be achieved by modifying the electronics of the aromatic rings. However these types of modifications have not been systematically incorporated in the "double deprotonation of diphenylacetic acid derivatives". Our strategy was to modify diphenylacetic acid templates to develop an indicator with an enhanced titration profile over existing methods. Early observations with organolithium reagents suggest that improvements in indicator design can be achieved with amide derivatives of this class of compounds. Supported by NSF-HBCU-UP #0411383.

## Magnetic Observation of Ni Nanomagnets

**Longfei Ye**

Dept. of Physics and Astronomy, USC Columbia

Nanoscale ferromagnetic structures are increasingly important for many applications, including magnetic recording heads, magnetic random access memory, and are being developed for biosensors and targeted disease therapy. For chemically-synthesized magnetic nanoparticles, it is difficult to image the domain structure present within a particle, but understanding single nanomagnet properties is critical for developing novel devices. Lithographically-patterned nanomagnetic structures transition from multidomain behavior at the micrometer scale to single domain behavior at the nanoscale. The equilibrium magnetization of a nanomagnet is controlled by its volume, shape, and magnetocrystalline anisotropy. For example, out of plane magnetization is desired for high-density magnetic recording media. A candidate system for studying such effects is nanopatterned Ni. Ni dots with diameters ranging from 5 micrometers to 125 nm undergo a transition from stripe domains to a vortex structure, and finally to a single perpendicularly magnetized domain with decreasing size. We have fabricated thermally-evaporated Ni nanodots using electron beam lithography and liftoff with diameters of 5000, 1000, 500, 250, and 125 nm. We observe domain evolution using magnetic force microscopy similar to the results in Barman et al., 2006. Potential plasmonic and heat-assisted recording applications require that magnetic structures be in close proximity to noble metal nanostructures. To create such a structure, we have coated our Ni dots with a thin Au film. We compare the magnetic properties of these Au-coated nanomagnets with those of pure Ni dots to determine whether the interface composition affects the onset of vortex or single domain behavior in these nanodots.

## CHARACTERIZATION OF A HIGH-VALENT IRON INTERMEDIATE THAT ACCUMULATES DURING ENZYMATIC HALOGENATION REACTIONS

**Ryan Yonce** and Pamela Riggs-Gelasco

Dept. of Chemistry, College of Charleston

A new class of enzymatic halogenating enzymes was discovered in 2005. These new halogenases are able to add halides to fairly unreactive substrates by using a mononuclear iron atom that reacts with molecular oxygen to generate a highly reactive, highly oxidizing intermediate. While the three-dimensional structure of the resting enzyme has been determined, the molecular details of the intermediate are not known. Our study will provide the first structural insight into the nature of this important intermediate using x-ray absorption spectroscopy.

## IDENTIFICATION OF TWO TAGGED-INSERTIONAL MUTANTS OF *FUSARIUM GRAMINEARUM* IMPAIRED IN ASEXUAL REPRODUCTION

**Ashley D. Zearfoss**, Ashley G. Kelly, Joseph E. Flaherty, Larry Dunkle<sup>1</sup>,  
and Jin-Rong Xu<sup>2</sup>

Dept. of Science and Mathematics, Coker College

<sup>1</sup>USDA-ARS, Crop Protection and Pest Control Research Unit

<sup>2</sup>Dept. of Botany and Plant Pathology, Purdue University

*Fusarium graminearum*, the anamorph of *Gibberella zeae*, causes head blight (scab) of wheat and barley and is regarded as the plant disease exerting the greatest impact on U.S. agriculture and society during the past decade. Approximately \$3 billion were lost to U. S. agriculture during wheat scab epidemics in the 1990s. The fungus also infects



and causes disease on corn and rice. Grain infected by *F. graminearum* may also become contaminated with trichothecene and estrogenic mycotoxins, making it unsuitable for food or feed. To better understand fungal development and its relationship with pathogenicity, we developed and applied a phenotypic screen to identify random-insertional mutants of *F. graminearum* wild-type strain (PH-1) impaired in light-responsive asexual development. After screening >4,000 tagged-insertional mutants of *F. graminearum* derived from restriction-enzyme mediated integration (REMI) mutagenesis of PH-1, we identified two mutants, designated 6A8 and 8B5, that fail to produce macroconidia when cultured under conditions otherwise conducive for macroconidial development by wild-type and control strains. We used qPCR to analyze insertion events in both 6A8 and 8B5 and determined that both mutants contain a single insertion. These mutants will be characterized at a molecular level to determine the site of integration of the REMI plasmid, followed by complementation studies to confirm that the tagged mutation is responsible for the observed phenotype.

END

South Carolina Academy of Science  
2007 Meeting Abstracts

# South Carolina Academy of Science Annual Reports

**This section typically contains the following reports:**

- \* Report of the President / 2007 annual meeting
  - \* Report of the Secretary
  - \* Report of the Treasurer
  - \* Report of the SCJAS Treasurer
  - \* SCAS Legislative Funds
- \* Undergraduate Research Awards Committee
  - SCAS Two Year College Committee
  - AAAS Student Research Grants
  - NAAS/AJAS Delegate Report
    - \* MESAS
    - \* MESAS Financial Reports
    - \* Science & Engineering Fairs
      - \* DCYSC
  - \*Certified Metrication Specialist Program
- \* South Carolina Academy of Science Manual of Procedures

\* Denotes a report included in this section. Reports lacking a \* indicate a report not received in time for inclusion in the 2007 Bulletin

**President's Report**  
**Hans-Conrad zur Loye, President**

The 2008 South Carolina Academy of Science and South Carolina Junior Academy of Science Annual Meeting will be held at **Clemson University during the week of March 17th - 21st, 2008. Abstracts submissions will be due January 18th, 2008.**

The South Carolina Academy of Science was organized in 1924 and is dedicated to raise the level of science education in South Carolina by enhancing research and the transmission of knowledge within the State. The 79th Meeting of the South Carolina Academy of Science was held at the University of South Carolina, Columbia on Friday, March 10, 2006. The Senior Academy had a very successful meeting with 157 registrants and 105 presentations including 14 posters. The presentations were from nineteen different institutions across the State of South Carolina. There were nine concurrent topical sessions during the morning and afternoon sessions. There were many undergraduate presentations representing essentially all colleges and universities in South Carolina. Eight of these undergraduates received category awards and two received overall best presentation awards.

An organization like ours operates through the efforts of a large number of individuals who volunteer their time and resources and who perform all those small and large functions that keep us going - including organizing the annual meeting, helping out as judges at science fairs, organizing the junior academy or managing the Academy's journal. As President, I would like to thank the Officers of the organization, Council Members, Committee Chairs, Directors, Judges, and all Academy volunteers for making this an excellent year in promoting science, mathematics and engineering in our state.

Funding for the Academy comes from many sources that include fees for membership, registration fees at the annual meeting and support from business, industry and individuals. The Academy wishes to thank the Governor of South Carolina, the South Carolina Legislature, Roche Carolina, Inc., Mead Westvaco, Michelin North America, the Milliken Foundation, EPSCoR IDeA and the University of South Carolina, its colleges, departments, and the office of research, for their support of the academy and the 2006 annual meeting.

Every year the Office of the Governor, assisted by the Academy, presents three awards, The Governor's Awards for Excellence in Science. The Academy appreciates the help of the Governor's staff, Dr. Don Jordan and the rest of the Governor's Awards Committee for making these awards possible.

Dr. Thomas Reeves has organized an outstanding Annual meeting this year at Midland's Tech. The Academy appreciates the efforts of Dr. Reeves and the 2007 Meeting Committee at Midlands Tech for planning and hosting the 2007 annual meeting.

## **Report of the Secretary**

### **South Carolina Academy of Science**

#### **Council Meeting**

#### **Minutes of Meeting held January 27, 2006 at McCutchen House, USC Columbia.**

President Jim Privett called the meeting to order at 2:15 pm. Present: Jim Privett, Dwight Camper, Hans-Conrad zur Loye, David Stroup, John Safko, Alvin Fox, John Baynes, Jane Ellis, David Ferris, Tom Roop, Cassandra Runyon, Karin Beaty, Val Dunham, Rosemary Wicker, Radman Ali, Peter Fichte, Anthony Kurlychek, Scott Little

Jim Privett welcomed all and presented SCAS Service Awards to John Safko and Tom Roop. Minutes of the last meeting were presented. Motion was made and passed to accept the minutes as corrected.

#### Reports from Officers

##### Immediate Past President's Report

David Stroup passed out the list of candidates for next year's officers and council members. We have six nominations for council (Karen Beatty, Donald Castillo, Val Dunham, Virile Tisdale, Judith Salley-Guydon, Melissa Riley) and for vice president the nomination was Cassandra Runyon who has had to decline the nomination. Four councilors will be elected from this list. Voting will be open for 30 days on the SCAS website. Dave stated that he has been working on the patron membership letters and these are going out to ask for help to support the Annual Meeting and the Governor's Awards.

##### Past President's Report

Dwight Camper – no report

##### President Elect and Program Chair's Report

Hans-Conrad zur Loye stated that the Annual Meeting plans are going well and he then passed out a preliminary program for council perusal. He has raised enough money to cover the meeting. Bulletins are going to the printers soon. Information on parking and motels will be in the newsletter.

##### Vice President's Report

Anthony reported for Tom Reeves. Next year the Annual Meeting will be on Friday, April 13 at Midlands Tech's Airport Campus. Tom is presently working on the details.

##### Secretary's Report

Jane Ellis passed around the updated Officers and Councilors List for corrections as needed.

#### Treasurer's Report

John Safko reported that we have \$117,091.99 with 454 active members counting 40 patrons, 11 donors, 11 emeriti, 3 honorary and 52 life members. At this time 244 have paid dues so far this year.

#### Special Presentations

Scott Little presented an overview of EPSCoR and IdeA. EPSCoR is providing \$2000 support for the Annual Meeting. His organization is sponsoring "BIO 2010 Workshop: Transforming Undergraduate Education for Future Research Biologists" on Thursday, March 9 at USC immediately before the Annual Meeting.

Rosemary Wicker, representing the SCJAS Research Awards Committee, asked the council for more specific guidelines for judging. Jim Privett asked Rosemary, the committee and Karen Fox to develop what they think procedures and criteria should be. Discussion ensued about requirements and suggestions for the committee to consider.

#### Reports from Standing Committees

##### Bulletin Advisory Committee

David Ferris stated that the bulletin was going to the printers next week.

##### Governor's Awards and MESAS

Don Jordan was not present. No report was given on the Governor's Awards. Dave Stroup noted that Francis Marion University coordinated the MESAS statewide contest this year. He described the process and numbers of participants.

##### Newsletter

Mike Farmer was not present. No report was given.

##### Membership Committee

John Baynes will be getting his committee together soon and he asked for ideas from council as to how we might increase membership. A discussion about membership fluctuations ensued.

##### Publicity Committee

John Inman was not present but Jane Ellis presented his report. One proposed idea from the Publicity Committee was to develop a public relation intern position that might be filled by students in the School of Communication at USC and others. A motion made by Radman Ali and seconded by Alvin Fox was approved to provide up to \$1000 for the hiring of an intern to develop a publicity plan and to implement this plan. This intern would be under the direction of the Publicity Committee. The second proposal concerning SCJAS was not acted on because Karen Fox was not present.

##### Science Fairs/NAAS Representatives

Don Jordan (Editor of NAAS Newsletter) and John Safko will be attending the AAAS meeting in St. Louis, MO in February. Jim McKnight, teacher and head chaperone, along with five to six students will be in St. Louis representing SCJAS at the meeting.

#### Secondary Science/Mathematics Teacher of the Year

Tom Roop reported that 210 principals were sent information about the award. February 1, 2006 is the deadline for submission.

#### Old Business

None

#### New Business

John Safko asked that SCAS take a stand on the issue before the state subcommittee on education concerning the push to modify state science standards. The following motion was made by John and seconded by Alvin Fox. Motion: The Council of SCAS issues a statement that we support the initial biology standards issued by the South Carolina State Board of Education because they are scientific and testable. The motion passed.

Meeting adjourned at 4:40 p.m.

Respectfully submitted,  
Jane P. Ellis

### **South Carolina Academy of Science Council Meeting**

#### **Minutes of Meeting held March 9, 2006 at Carolina Room, Capstone, USC Columbia**

President Jim Privett called the meeting to order at 7:20pm. Present: Jim Privett, Dwight Camper, Hans-Conrad zur Loye, David Stroup, John Safko, Alvin Fox, Karen Fox, Jane Ellis, David Ferris, Tom Falvey, Karin Beaty, Val Dunham, Bill Pirkle, Linda Sinclair, Radman Ali, Peter Fichte, Tina Webb, Anthony Kurlychek.

Jim Privett welcomed all and thanked President Elect and Program Chair zur Loye for the excellent job he has done in putting this year's Annual Meeting together. Minutes of the last meeting were presented. Motion was made and passed to accept the minutes as read.

#### Reports from Officers

##### President

Jim Privett noted that SCAS's letter addressed to the SC State Board of Education supporting the current state science standards has been well received. A copy of the AAAS letter has been sent to each member of the SC State Board of Education Committee.

#### Immediate Past President's Report

David Stroup discussed the list of candidates for next year's officers and council members. David Gangemi will be the nominee for vice president. There are six nominations for council (Karin Beaty, Donald Castillo, Val Dunham, Virlie Tisdale, Judith Salley-Guydon, Melissa Riley) with four councilors to be elected from this list. Voting will take place online beginning on March 11 and will continue for 30 days. Directions for voting are found on page 2 of the Newsletter. Dave stated that he has mailed 150 patron membership letters. Roche Carolina, Inc. and MeadWestvaco plan to continue their support for the Governors' Awards.

#### Past President's Report

Dwight Camper noted the need for increased SCAS publicity. Anthony is working on this. Discussion on ways to increase visibility and membership ensued.

#### President Elect and Program Chair's Report

Hans-Conrad zur Loye discussed logistics of the meeting and mentioned that the plenary session keynote presentation, "Images of the Nanoscale: What they say, what they suggest", by David Baird should be noteworthy.

#### Vice President's Report

Anthony reported for Tom Reeves who was not present. The 2007 Annual Meeting to be held at Midlands Tech's Airport Campus has been changed to April 20.

#### Secretary's Report

Jane Ellis passed around the updated Officers and Councilors List for corrections as needed.

#### Treasurer's Report

John Safko passed around copies of the treasurer's report and stated cash on hand is \$86,202.80 with dues collected to date \$4,600. Safko then passed out the list of new members to be approved by the Board. He moved the list be approved for membership in SCAS. zur Loye seconded the motion. Motion to approve the new members passed.

#### Reports from Standing Committees

##### Bulletin Advisory Committee

David Ferris stated the bulletin is out and 600 copies have been printed. He noted that this year's electronic abstract submission has been better than in the past.

#### Governor's Awards and MESAS

Don Jordan passed out the bios of the four Governors' Award winners. He noted there were excellent candidates for the awards. Award winners are listed below:  
Excellence in Scientific Research - Yusuf Hannun, M.D. (MUSC)  
Excellence in Scientific Awareness - Rebecca Bullard-Dillard, Ph, D. (Clafin Univ.)  
Excellence in Scientific Awareness - Omar Bagasra, M.D., Ph.D. (Clafin Univ.)  
Young Research Award in Sci. Research - Karen Burg, Ph.D. (Clemson Univ.)

There was a MESAS Low Country Workshop on February 4, 2006 that was well attended. Francis Marion University coordinated the MESAS statewide contest this year. There were 718 submissions.

#### Publicity Committee

John Inman was not present. Anthony plans to meet with John to work on publicity.

#### Science Fairs

Tina Webb reported that the science fair organized by both South Carolina and Georgia has been lost to Georgia.

#### Secondary Science/Mathematics Teacher of the Year

Tom Roop was not present. No report given.

#### Undergraduate Research Awards

Bill Pirkle announced there were 40 undergraduate presentations with most coming from the College of Charleston and USC-Aiken. This number is down from previous years probably due to the date of the Annual Meeting. He has secured 14 judges for the seven sections.

#### **Other Reports**

##### SCJAS

Karen Fox stated that there will be 134 oral presentations (up 10 from last year) with 250 preregistered for this meeting. During the year she contacted every high school in the state and at least one science teacher at each school.

##### Sigma Xi Research Awards

John Safko reported there are no graduate awards this year because the USC Sigma Xi chapter is nonexistent. The chapter at Clemson is doing well and sponsors the undergraduate awards each year.

##### NAAS

John Safko noted that five students and one teacher attended the AAAS Annual Meeting in St. Louis this February along with John and Don Jordan.

##### Old Business

Linda Sinclair passed around the Governor's Proclamation declaring South Carolina Science Week. She aligns SC Science Week with the SCAS Annual Meeting. She has "points of contact" in every school in the state therefore can get information out to the teachers so they can plan special activities for the week. She also suggests activities for them.

##### New Business

None

Meeting adjourned at 9:15pm.



Respectfully submitted,  
Jane P. Ellis

**South Carolina Academy of Science  
Business Meeting  
Minutes of Meeting held March 10, 2006 in the Belk Auditorium of the  
Close/Hipp Building, USC Columbia.**

Meeting was opened by President Jim Privett at 12:30pm.

Report from the President – Jim Privett thanked Hans zur Loye for organizing the 2006 Annual Meeting and the University of South Carolina for hosting the meeting. There are 91 presentations and 14 posters. SCAS had 157 registered and SCJAS had 154 registered. He announced that next year's Annual Meeting would be held on April 20, 2007 at Midlands Tech in Columbia. Jim described the procedure for voting online. The website for voting will be open for the next 30 days.

Report from the Treasurer – John Safko reported SCAS has \$86,202.80 on hand with a \$60,000 CD at NBSC maturing on April 11 with slightly more than \$1,200 in interest. Annual Meeting income so far is \$1,787 and \$301 for meals. Dues received to date totals \$4,600 with donations of \$29 from members. Other information can be found on the Finance Report.

Old Business – None

New Business – John Safko presented the proposed constitutional amendment announced in the newsletter. No second is required. Motion carried to accept the change in the constitution listed below.

Article IX. Western Upstate Regional Science Fair

Section 1. The South Carolina Academy of Science Upstate Science Fair (SCASWURF), also known as the AOP Regional Science Fair of SC Region IB Science Fair shall be a subsidiary organization of the Academy. The Academy shall assist the AOP Regional Science Fair by providing financial oversight to aid it to provide a regional science fair to encourage an interest in science and engineering among students that region of South Carolina.

Section 2. The Officers will consist of at least three persons: The Science Fair director, an Executive director, and a member of SCAS appointed by the SCAS president with the approval of Council. The sole purpose of SCASWURF is to raise funds to operate a regional science fair in the Western Upstate Region and to send delegates to the International Science and Engineering Fair (ISEF).

Section 3. The affairs of the AOP Regional Science Fair shall be governed by a Board of Directors, which includes the officers listed in Section 2 and other interested persons, as specified by the Bylaws of SCASWURF. These Bylaws shall be revised by the Board of Directors of SCASWURF, and shall be ratified by the Council of the Academy.

Current Article IX becomes Article X

Meeting closed at 12:50pm.  
Respectfully submitted,  
Jane P. Ellis  
Secretary SCAS

**South Carolina Academy of Science**  
**Council Meeting**  
**Minutes of meeting held July 7, 2006 at USC Columbia,**  
**Room 101 Graduate Science Research Center**

President Jim Privett called the meeting to order at 2:14 PM. Present: Val Dunham, Karen Fox, Dwight Camper, Jim Privett, John Safko, Dave Ferris, Bill Pirkle, Hans-Conrad zur Loye, Tom Reeves, George Shiflet, Alvin Fox, Lucia Pirisi-Creek, Radman Ali, Judith Salley Guydon, Anthony Kurlychek.

Jim Privett welcomed everyone and passed the gavel to new SCAS President Hans zur Loye. Minutes of prior meeting were presented. Motion was made by Tom Reeves for approval, Seconded by Karen Fox. Motion was unanimously passed to accept minutes as read.

**Reports from Officers**

**President**

Thanked Dr. zur Loye and the Academy for a great Annual Meeting.

**Immediate Past President**

David Stroup was not present.

**Past President**

Dr. Camper noted that the Academy needs to spread the word about the SCAS throughout the state and its institutions. A discussion was raised on methods to increase membership. Discussion also raised regarding the Governor's Award winners and having them join SCAS and/or conduct a session at the following year's Annual Meeting.

**President Elect**

Dr. zur Loye started a lengthy but productive discussion concerning his email to all of council regarding the future goals of the SCAS. Discussion continued concerning ways to increase SCAS membership, gain state-wide recognition from schools and businesses, and what the SCAS will offer its members.

Alvin Fox presented a motion to include the name of the South Carolina Academy of Science within the title of any important function we are involved or associated with. Motion was seconded by George Shiflet, and carried unanimously.

There was a recommendation to investigate whether above motion should include the Governor's Award also.

It was decided Anthony Kurlychek would send postcards to all faculty of every SC university and college mentioning the Academy's Newsletter.

Anthony Kurlychek is also to add the Academy's letter stating their position on creationism to the SCAS web site. Anthony also is to email the entire SCAS membership

prior to their quarterly meetings asking them for issues they may have concerning the Academy.

Vice President

Annual Meeting for 2007 will be held at Midlands Technical College at the Airport Campus April 20<sup>th</sup>, 2007. Anthony Kurlychek is to add the Airport Campus mention to the SCAS web site.

Secretary

Dr. Ellis was not present.

Treasurer

Dr. Safko stated there were assets of \$50, 923.89. He also passed out the planned budget for 2006-2007. Safko motioned to approve budget. Motion seconded by Dr. zur Loye, and carried unanimously. Dr. Safko discussed the new members list and procedures for new membership.

**Reports from Standing Committees**

Bulletin Advisory Committee

Dr. Ferris mentioned that the current printer of the Bulletin takes three weeks to get them printed, so he is looking into other possible publishers. He is very far behind with the Journal. Last Fall's issue is not on the web site yet. Dr. Ferris asked help from the entire council to find reviews of articles for the Journal.

Governor's Award

Dr. Jordan was not present. Anthony Kurlychek passed out the Call for Nominations for the 2007 Award.

Membership Committee

John Baynes no longer with the Academy.

Newsletter

Mike Farmer was not present.

Nominations and Elections

Dr. Stroup was not present.

Patron Membership

David Stroup was not present.

Publicity

John Inman was not present.

Undergraduate Research Awards

Bill Pirkle mentioned the award winners for 2006. 2006 was the first time Poster Sessions received any award.

SCJAS

The SCJAS has their Fall workshop at Erskine College Oct. 14<sup>th</sup>, 2006. Their Winter workshop will be at Spartanburg – date not mentioned. The Fall 2007 workshop is set, but the information was not available yet.

Overall participation in the SCJAS is up according to Dr. Fox. There is also a new treasurer for the SCJAS.

#### MESAS

Anthony Kurlychek spoke for Dr. Jordan. He mentioned the MESAS Contest 2006 once again had record numbers for entrants, and that the contest was becoming one of the premier events of the Academy. Creation of the 2007 Contest will be done by USC Columbia professors.

Girls day in Science was a success with many people interested in learning more about MESAS. Also, ETV swapped web site links with the SCAS so both sites would promote the other.

#### Science Fairs

Anthony Kurlychek passed out information on the 2006 Region II Fair. Record numbers were posted for that, as well. Graham Van Schaik won second place in Environmental Science at ISEF.

#### Old Business

None.

#### New Business

None.

#### Good of the order

Dr. Judith Salley Guydon, interim member of the SCAS was introduced to the council.

Meeting adjourned at 4:00PM.

Minutes submitted by Anthony Kurlychek

### South Carolina Academy of Science

#### Council Meeting

#### **Minutes of Meeting held September 29, 2006 at USC Columbia, Room 101 Graduate Science Research Center**

President Hans-Conrad zur Loye called the meeting to order at 2:45 PM. Present: Hans-Conrad zur Loye, John Safko, Jane Ellis, Dave Stroup, Tom Reeves, Bill Pirkle, Don Jordan, Lucia Pirisi-Creek, Sharon Gilman, Radman Ali, Anthony Kurlychek.

Hans zur Loye welcomed everyone. Minutes of the July 11, 2006 meeting were presented. Motion was made by John Safko for approval and seconded by Radman Ali. Motion was passed to accept minutes as read.

#### Reports from Officers

##### President

Dr. zur Loye passed around and discussed points in a draft version of an SCAS Five-Year Plan he prepared. Topics on the Five-Year Plan included SCAS's mission statement, the Journal, Governor's Awards, the Annual Meeting, publicity, the website and a possible SCAS executive director position. A discussion ensued on

each topic. Dr. zur-Loye will work with various members of the council to study each topic and decide on a plan of action

The possibility of a new Governor's Award to be given to a faculty member from a primarily undergraduate institution was discussed. A motion was made by John Safko to have the Governor's Award Committee add a Fourth Award if funds were available. This award would go to a candidate from a primarily undergraduate institution. Dr. zur-Loye charged the Governor's Awards Committee to look into the feasibility of such an award and criteria necessary. Ali seconded the motion and after discussion the motion passed. Dave Stroup volunteered to help obtain funding for this award.

#### Immediate Past President

Jim Privett was not present. No report was given.

#### Past President

Dave Stroup noted that Science South has two large trailers filled with science experiments and demonstration material for K-12 programs. These trailers will be taken around the state for use by schools. Roche Carolina has fully funded these trailers. SCAS might be able to get its name associated with this material.

Dave reported for Tom Roop on the Teacher of the Year Award. Dr. Roop noted that the website was using the old title for the award. The award title was changed to "Excellence in Secondary Math or Science Discovery" last year.

#### President Elect

Tom Reeves gave out material and discussed plans for the 2007 Annual Meeting to be held Friday, April 20, 2007 at the Midlands Technical College Airport Campus.

#### Vice President

David Gangemi was not present. No report was given.

#### Secretary

Dr. Ellis passed around a copy of the latest List of Councilors and Officers for corrections. Copies of the list were given out to all who wanted them.

#### Treasurer

Dr. Safko passed out a treasurer's report. He stated cash on hand is \$53,217.31 with \$16,493.39 of this being the AOP Science Fair account. Dr. Safko discussed and then made a motion for a constitutional change adding a new Article 10 and Article 11. The new Article 10 concerns Midlands Regional Science Fair being added to our constitution in the same manner as the Western Upstate Regional Science Fair was added last year. Article 11 is the old Article 10 with no change. Don Jordan seconded the motion and council passed this motion. The secretary was charged to send this change on to be published in the Newsletter so the constitutional change can be voted on at the Annual Meeting.

## **Reports from Standing Committees**

### Bulletin Advisory Committee

Dr. Ferris was not present. Anthony Kurlychek reported for him. Anthony passed around what was needed for the Bulletin. Deadline for inclusion in the Bulletin will be March 2, 2007 for papers and registration.

### Governor's Award

Dr. Jordan had no report. See previously discussed material under President's report.

### Membership Committee

John Safko passed out a copy of new members. Dues notices are going out and numbers of members will increase when abstracts and registration materials for the Annual Meeting start coming in.

### Nominations and Elections

Dr. Privett was not present. Dr. Stroup had talked to Jim Privett about the nominations and elections. Dr. Stroup and Dr. Privett will be working on this together.

### Publicity

John Inman was not present. No report given.

### Undergraduate Research Awards

Bill Pirkle would like to work with Tom Reeves on the scheduling of papers for the Annual Meeting to help organize the judging of undergraduate awards. A discussion of the mechanics of the poster session ensued.

### SCJAS

Karen Fox was not present. Anthony Kurlychek stated that the SCJAS Fall Workshop would be held at Erskine College on November 11, 2006.

### MESAS

Don Jordan discussed the upcoming MESAS Workshops. One will be held at Lander University on October 14, 2006 and another will be held at Benedict College on November 11, 2006. Benedict College's Workshop has 33 sessions. He mentioned that the MESAS Contest once again is expecting record numbers of entrants and the contest is very popular. SCAS has a booth at SC<sup>2</sup> this year and this is a good place to promote the activities of the academy. We need people to man this booth. Don noted that we need a place to display SCAS materials.

### Science Development

Val Dunham was not present. No report given.

### Science Fairs/NAAS Representatives

Don Jordan reported that Region VI has stopped having its science fair. Barbara Smokes has volunteered to work on restarting this regional science fair.

**Old Business**

None.

**New Business**

None.

**Good of the Order**

Radman Ali announced that Dr. Kenneth Wilson, Nobel Laureate, would be speaking at Morris College on March 29, 2007. He welcomed SCAS and other institutions participation in this event.

Meeting adjourned at 4:35 PM.

Respectfully submitted,

Jane P. Ellis

## SCAS Treasurer's Report for August 1, 2005 through July 31, 2006

This report contains information on the funds under the direct control of the SCAS Treasurer. It does not contain SCJAS, SCJAS Trust, and some MESAS Accounts.

### Category Summary Report

8/1/05 through 7/31/06

<b>Inflows</b>	
AOP-Income:	
Districts Support	11,000.00
Donations	32,500.00
AOP-Income - Other	0.00
	<hr/>
Total AOP-Income	43,500.00
AW-InvertebrateBio	250.00
Aw-misc-I	225.00
Bulletin-I	164.52
Donations	1,029.00
Dues05-06	10,725.00
Dues06-07	186.00
Gaes-I	4,850.00
Interest	1,436.24
ISEF-I(05)	3,862.49
ISEF-I(06)	16,563.90
meet-in-06:	
meals	301.00
registration	1,812.00
	<hr/>
Total meet-in-06	2,113.00
MESAS-I:	
direct meeting	889.00
	<hr/>
Total MESAS-I	889.00
NAAS-I	158.27
Scj-re-aw-I:	
meeting	250.00
Scj-re-aw-I - Other	1,750.00
	<hr/>
Total Scj-re-aw-I	2,000.00
Scjas-I	20,000.00
Sigxiug-I	150.00
StateGrant	95,000.00
Inflows - Other	1,890.00
	<hr/>
<b>Total Inflows</b>	<b>204,992.42</b>



# Category Summary Report

8/1/05 through 7/31/06

continued

<b>Outflows</b>	
AOP-Expense:	
Admin-supplies	6,325.83
Awards	13,579.60
ISEF	3,182.60
Salary-Indep Contractor	11,000.00
T-Shirts	1,538.25
Total AOP-Expense	35,626.28
Bulletin-E	5,348.85
Council-E	117.22
Gaes-E	5,808.64
ISEF-E(06)	28,423.59
Meet-ex-06:	
meals	301.00
operations	425.90
Total Meet-ex-06	<u>726.90</u>
MESAS-E:	
announcement,supplies	1,140.94
Awards-contest	6,363.00
direct meeting exp	1,615.00
MESAS-E - Other	150.00
Total MESAS-E	<u>9,268.94</u>
metcer:	
prep and postage	305.20
Total metcer	<u>305.20</u>
NAAS-E	66.29
news-SCJAS	2,973.31
Newsletter	3,060.95
Office-Gen:	
equipment:	
data Process	1,578.30
equipment - Other	1,079.40
Total equipment	<u>2,657.70</u>
General operations	2,354.48
Office supplies	6,498.62
phone	207.25
postage	114.76
Printing, prep, postage	4,064.94

# Category Summary Report

8/1/05 through 7/31/06

continued

rents	248.00
Salary:	
fringe	8,499.15
GA supplement:	
bonus	100.00
GA supplement - Other	3,600.00
	<hr/>
Total GA supplement	3,700.00
pay:	
post Doc	9,750.00
PT student	4,359.54
under grad	804.40
pay - Other	26,422.59
	<hr/>
Total pay	41,336.53
Salary - Other	355.00
	<hr/>
Total Salary	53,890.68
Travel	732.60
Unknown charge for balance	50.00
	<hr/>
Total Office-Gen	70,819.03
Office-Treas:	
banking fee	-100.00
postage	828.81
supplies	292.93
Office-Treas - Other	120.00
	<hr/>
Total Office-Treas	1,141.74
Postage	-63.76
Postage2	141.02
Postage3	189.91
SCAS-Transfer	9,522.73
Scj-re-aw-E	1,042.81
SCJAS-AJAS	8,529.20
Scjas-E-post	330.00
Scjas-E-Print	5,697.78
SCJAS-Expenses	825.20
Sf	210.00
Sigxiug-E	600.00
Toy	621.32
Outflows - Other	0.00
To Postage	4,160.00
	<hr/>

# Category Summary Report

8/1/05 through 7/31/06  
continued

<b>Total Outflows</b>	<b>195,493.15</b>
<b>Net Inflows/Outflows</b>	<b>9,499.27</b>

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## Financial Statement SCAS/AOP Combined

	1 August 2005	31 July 2006
SCAS Checking Account.....	\$10,155.53.....	\$30,140.74
Commercial Money Market.....	\$33,458.39.....	\$20,272.87
Postage Account.....	\$730.87.....	\$600.48
AOP Science Fair Account.....	\$8,619.67.....	\$16,493.39
<b>TOTAL .....</b>	<b>\$52,964.46.....</b>	<b>\$67,507.48</b>

**FINANCIAL STATEMENT**  
**SOUTH CAROLINA JUNIOR ACADEMY OF SCIENCE**  
**July 1, 2005 – July 31, 2006**

BALANCE ON HAND 7/1/05		<b>\$ 15904.20</b>
(NBSC Checking Account)		
<b>INCOME</b>		
Interest	15.48	
Dues	1810.00	
Fall Workshop (Coker)	1540.00	
Winter Workshop (Spring Valley)	1335.00	
Annual Meeting Registration Fees (USC Columbia)	2855.00	
SC State Dept. of Education	5000.00	
Donations	0.00	
<b>TOTAL INCOME</b>	<b>12,555.48</b>	
<b>EXPENSES</b>		
Fall Workshop (Coker College) (food & printing)	1793.26	
Winter Workshop (Spring Valley)	905.14	
Annual Meeting (USC Columbia)		
(food, lunch & awards banquet)	0.00	
(badges, ribbons, supplies, & printing)	1329.91	
Student Awards		
Certificates, Ribbons & Supplies (Annual Meeting)	125.37	
Monetary Awards for Research (Annual Meeting)	14,770.00	
American Association of Physics Teachers Awards	200.00	
Explorers Club Awards	200.00	
Fall Workshop		
Challenge Bowl and Speaking of Science	379.38	
Winter Workshop		
Science Olympics and Speaking of Science	339.38	
Travel Grants to Schools (fall workshop)	1500.00	
(winter workshop)	1480.00	
(annual meeting)	670.00	
Newsletters	0.00	
SCJAS Board Travel	773.19	
Executive Treasurer	103.66	
Executive Director (repair of Challenge Bowl Equipment)	<u>248.46</u>	
<b>TOTAL EXPENSES</b>	<b>24,817.75</b>	
<b>NET INCOME (DEFICIT)</b>	<b>(12,262.27)</b>	
<b>TRANSFER OF FUNDS FROM SCAS</b>	<b>10,000.00</b>	
<b>JUNIOR ACADEMY BALANCE 6/30/05</b>		<b>\$ 13,641.93</b>
(NBSC Checking Account)		
<b>TRUST FUND BALANCE</b>		
6/30/05		131,533.76
12/31/05		132,950.51

## 2006 SCJAS Funding

Student Name	Project Title	School	Teacher	Funded
Vineela Ayyagari	The effect of conjugated linoleic acid on HL-60 human myeloid leukemia and NAMALWA non-Hodgkin's lymphoma	Spring Valley High School	Maria Duricko	\$45.00
John Maney	The phytoremediation of Chromium-contaminated water by <i>Hydrilla verticillata</i>	Spring Valley High School	Maria Duricko	\$68.10
Ashley Dent	The antimicrobial effects of <i>Penicillium vulgare</i> on the growth of <i>Staphylococcus epidermidis</i>	Spring Valley High School	Maria Duricko	\$88.40
Machelle Zhang	The Modulation of 5-Fluorouracil in skin cancer cells by conjugated Linoleic Acid	Spring Valley High School	Dale Soblo	\$185.00
Graham Van Schaik	Pyrethroids as endocrine disruptors: the effect of crop-mimicking pyrethroid levels (as determined by application to <i>Lycopersicon esculentum</i> ) on the expression of the WNT 10B proto-oncogene for human breast cancer	Spring Valley High School	Robin Henderson	\$175
John Hodge II	Observing short term changes in the brightness of particular variable stars	Spring Valley High School	Dale Soblo	\$43.25
Carlin Baeright	The effect of aquidene on T-47d breast cancer cell lines	Spring Valley High School	Dale Soblo	\$35.00
Gina Noh	The effect of various anti-corrosives on the corrosion of iron	Spring Valley High School	Dale Soblo	\$175.00
Arlen Chen	The effect of different disinfectants on sterilizing the bacterial concentration of <i>Staphylococcus epidermidis</i> on computer keyboards	Spring Valley High School	Dale Soblo	\$35.00
Sarah Tryon	The effects of various sanitizing methods on the growth of <i>Staphylococcus epidermidis</i> on rubber infill artificial turf	Spring Valley High School	Maria Duricko	\$173.70
Anita Shah	The determination of Heavy Metals and Volatile Organic Compounds in Tattoo Inks	Spring Valley High School	Dale Soblo	
Sean Hastings	The effect of three different 5-10-31 fertilizer concentrations on the survival rate of	Spring Valley High School	Dale Soblo	
Guneet Malhi	The effect of Insole Length and Height on the Stride Length of Runners	Spring Valley High School	Dale Soblo	
Joao Mshu	The effect of straight, reward-swept, and delta wings on lift, speed, acceleration, total time and distance flown	Spring Valley High School	Dale Soblo	
Yvonne K. Kao	Can the world's food shortage be reduced by simple physical or chemical treatments of seeds of agricultural plants to improve yields from growing plants?	Riverside High School	Neil Kao	\$38.25
William Shrader	The effect of a simulated electromagnetic pulse on portable computer storage devices	Spring Valley High School	Maria Duricko	
Emily Nellermoe	The effect of face proportions on personality perception	Spring Valley High School	Dale Soblo	
James Cunningham	The effect of bright-light and dawn simulation therapies respectively on teenage sleep patterns	Spring Valley High School	Dale Soblo	
Sudsep Sunthakar	Can an advanced computer program replace a doctor at the diagnostic stage of patient treatment	Spring Valley High School	Dale Soblo	
				\$ 1,042.81

**South Carolina Academy of Science  
Legislative Funds Report 2006  
By Don Jordan**

South Carolina Academy of Science receives Legislative Funds

The Academy's deep commitment to stimulate the creative abilities of the youth of our State and to provide learning opportunities that allow for the development of their talents is recognized by the South Carolina State Legislature. SCAS received funds to establish a central office to: Strengthen the eight regional science and engineering fairs; To further develop existing regions of MESAS, Middle / Elementary School Academy of Science, (4th - 8th grades founded 1991) and to establish regions in the Hilton Head, Spartanburg/Rock Hill and Aiken Areas; To introduce K - 3 pilot plan for KESAS Kindergarten / Elementary School Academy of Science; To strengthen the Junior Academy of Science (9th-12th) by including more rural schools/more scholarship opportunities; To manage Discovery Fair's {Public Awareness of Science, Math, & Engineering} eleven-day event of hands-on activities at the State Fair which generally includes 25-30 high schools and middle school students managing the booths; To complete the pilot CMS program with a final goal to certify one teacher in all of the 1,645 schools in SC {Private and Public} as Certified Metric Specialist.

USC, through the efforts of Dean Pat Moody, Dean Gerald Crawley and Dean Mary Anne Fitzpatrick has provided offices, computers, office equipment and computer technical support for the office of the South Carolina Academy of Science. Without the support of Dean Moody of the College of Hospitality, Retail and Sports Administration, The College of Arts and Sciences and its Center for Science Education, it would not be possible for the Academy to expand its outreach efforts to the students of South Carolina. In addition, Senator Nikki Seltzer of Lexington, Senator Don Holland, Kershaw, Senator John Corson, Senator Warren Giese, and Rep. Robert Harrell played a vital role in establishing funds for SCAS. The Academy extends its gratitude to all those in the legislature and the membership & friends of SCAS that provided expert advice and leadership during the three year journey to obtain funds for SCAS. The Academy owes a great debt to Dr. Daniel J. Antion for his tireless efforts and expertise in working the South Carolina Legislature. Without Dr. Antion there would be no funds to support SCAS outreach efforts.

## UNDERGRADUATE RESEARCH AWARDS COMMITTEE

N. Dwight Camper, Chair

The South Carolina Academy of Science in cooperation with Charleston and Clemson Chapters of Sigma Xi recognized outstanding undergraduate research at colleges and universities within the State of South Carolina. The purpose of the awards is to foster, encourage, and recognize the work done by South Carolina undergraduate students on projects of exceptional scientific merit.

The Academy also awarded the Horace Byrne Award for outstanding frontier scientific research conducted by an undergraduate student. This award is sponsored by the Explorers Club of Columbia, SC.

The American Association for the Advancement of Science sponsored awards for the outstanding male and female undergraduate science students. The recipients of the AAAS awards receive a one-year honorary membership in AAAS that includes a year's subscription to *Science* magazine.

The awards were made by a panel of distinguished judges from industry and academia and were based on the research presented by the students at the Academy's Annual Meeting on March 10, 2006 at the University of South Carolina in Columbia.

### 2006 Outstanding Undergraduate Research Awards

**Michael Coggins**, Department of Chemistry and Biochemistry, University of South Carolina Columbia. *Probing the Mechanism of Dehalogenation by C. Fumago.*

**Rachel Hipp**, Department of Chemistry and Biochemistry, University of South Carolina Columbia. *Characterizations of the Chemical Composition of Latent Fingerprints by Gas Chromatography/Mass Spectrometry.*

**John Knight**, Department of Chemistry and Biochemistry, College of Charleston. *Synthesis of Heterocyclic Compounds Using New Methodology with Dianions of Beta-Diketones.*

**Melissa Sims**, Department of Physics & Astronomy, College of Charleston. *A Study of HD21071 Based on New Data.*

**Brittany Smith**, Department of Computer Science, Furman University. *Access Control on the Semantic Web.*

**Melissa Warren**, Department of Biology and Geology and Department of Chemistry, University of South Carolina Aiken. *Chemical Analysis of Pigmented Sclerites from Diseased Coral Sea Fans.*

**Zach Wilson**, Department of Biology and Geology, University of South Carolina Aiken. *Characterization of the Retroviral Vector pLNPolIX.*

**2006 Horace Byrne Explorers Club Award for Outstanding Frontier Science  
by an Undergraduate Scientist**

**Melissa Sims**, Department of Physics & Astronomy, College of Charleston. *A  
Study of HD21071 Based on New Data.*

**2006 American Associate for the Advancement of Science Award to the  
Outstanding Male and Female Undergraduate Scientists**

**Michael Coggins**, Department of Chemistry and Biochemistry, University of South  
Carolina Columbia. *Probing the Mechanism of Dehalogenation by C. Fumago.*

**Melissa Warren**, Department of Biology and Geology and Department of  
Chemistry, University of South Carolina Aiken. *Chemical Analysis of  
Pigmented Sclerites from Diseased Coral Sea Fans.*

The Academy extends its thanks and appreciation to the 2006 Annual Meeting judges who did an outstanding job of evaluating the undergraduate presentations. The judges for the 2006 Annual Meeting were: Dr. Dwight Camper, Clemson University; Dr. Val Dunham, Coastal Carolina University; Dr. Jane Ellis, Presbyterian College; Dr. Joe Emily, South Carolina State University; Dr. Danny Faulkner, University of South Carolina Lancaster;

Dr. Bob Feller, University of South Carolina Columbia; Dr. Sharon Gilman, Coastal Carolina University; Dr. John Inman, Presbyterian College; Dr. Rahina Mahtab, South Carolina State University; Professor Elizabeth Mayo, South Carolina State University; Dr. Jim Privett, University of South Carolina Sumter; Dr. John Riley, DSB Scientific Consulting; Dr. Ron Ruszczyk, University of South Carolina Aiken; and Dr. Tyrone Toland, University of South Carolina Upstate.



**Two-Year College Committee Report**

*NO 2006 REPORT RECEIVED*

**AAAS Student Research Grants Report**

*NO 2006 REPORT RECEIVED*

**Report of the  
National Association of Academies of Science (NAAS) Delegates**

*NO 2006 REPORT RECEIVED*

## **Middle/Elementary School Academy of Science (MESAS)**

### **CLUB MEMBERSHIP:**

Middle School Science Club membership costs \$4.00 per member. This entitles each member to receive the *SCJAS Newsletter* and other published information about MESAS. *The South Carolina Junior Academy of Science (SCJAS) Newsletter* is published four times during the school year. Each member of the Middle School Academy will also be a junior associate with all member benefits of SCJAS.

### **INDIVIDUAL MEMBERSHIP:**

Individuals may join for \$4.00. Parents may act as the sponsor. Students who attend a MESAS Fall Workshop automatically become MESAS members.

### Activities:

Regional Fall Workshops  
Regional Science & Engineering Fairs  
Eligible to Present at the S C Academy of Science Annual Meeting  
Eligible for Mail-In Contest  
Eligible for Young Researcher  
Grants-In Aid Program

### **FOR MORE INFORMATION**

#### **CONTACT :**

**Dr. Don Jordan**

**MESAS State Director and Founder  
South Carolina Academy of Science**

**Center for Science Education**

**Sumwalt Room 323**

**1212 Green Steet**

**University of South Carolina**

**Columbia, S.C. 29208**

**Phone (803) 777-7007**

**FAX: (803) 777-4396**

**E-mail: [jordan@gwm.sc.edu](mailto:jordan@gwm.sc.edu).**

**Web [www.cosm.sc.edu/jordan](http://www.cosm.sc.edu/jordan)**

# ANNOUNCING

## 2006-2007 YOUNG RESEARCHER GRANTS-IN-AID

Sponsored by  
The South Carolina Academy of Science  
in conjunction with the  
South Carolina Middle/Elementary Academy of Science Board

### \* GRANTS \*

TO STUDENTS TO DO SCIENCE RESEARCH PROJECTS

MIDDLE/ELEMENTARY SCHOOL STUDENTS ARE ENCOURAGED TO APPLY

**How! . . .** See Your Teacher or Contact Your Middle/Elementary School  
Regional Director (see below)

**When! . . .** *Right Now* . . . Get your proposal in! Proposals are accepted year  
round.

**How Much! . . .** Awards are for \$25 to \$100

**Recognition! . . .** Special Certificate of Merit and statewide publicity releases

**Western Region I**  
Paige Ouzts, Director  
Physics Department  
Lander University  
Greenwood, SC 29649  
Ph: 864-388-8277  
E-mail: [pouzts@lander.edu](mailto:pouzts@lander.edu)

**Sandhills Region IV**  
Dr. Tom Roop, Director  
Biology Department  
Francis Marion University  
Florence, SC 29501  
Ph: 843-661-1404/Fax: 843-661-1696  
E-mail: [troop@fmarion.edu](mailto:troop@fmarion.edu)

**Midlands Region II  
and Regions I, III, VI, & VII**  
Dr. Don Jordan  
Center for Science Education / College of  
Arts & Sciences, USC  
Sumwalt Room 323  
Columbia, SC 29208  
Ph: 803-777-7007 / Fax: 803-777-4396  
E-mail: [jdoran@gwm.sc.edu](mailto:jdoran@gwm.sc.edu)

**Low Country Region V**  
Mary Whaley, Director & Science Specialist  
Berkeley / Dorchester Math & Science Hub  
112 Joyce Lane  
Summerville, SC 29483  
Ph: 843-821-4523  
E-Mail: [whaleymo@yahoo.com](mailto:whaleymo@yahoo.com)

If a student receives a research grant, then he or she must make a 10-minute ORAL presentation at the next SCAS/SCIAS/MESAS Annual Meeting (April 13, 2007, at Midlands Tech).

For information contact: Dr. Don Jordan at the address/phone/fax/e-mail above, or  
visit <http://www.hrsm.sc.edu/jordan/> (click on MESAS).

**2006 MESAS MAIL-IN CONTEST  
SETS ANOTHER RECORD NUMBER OF ENTRIES: 717  
Winners Announced May 2006**

By Dr. Don M. Jordan, MESAS State Director

The State-wide MESAS mail-in contest was held this winter & spring. There were a record number 717 entries, with 482 students from grades 4-6 and 235 students from grades 6-8. This year, the contests proved to be especially challenging and covered a broad range of topics with emphasis on Biology. We are grateful to Francis Marion University for the creation of this year's contest. The authors of the 2006 contest are faculty and staff from Francis Marion University. They are: Dr. David Stroup – 2004 Governor's Award winner for Excellence in Science, Dr. Tom Roop – 1998 Service Award Winner, Dr. Larry McCumber – 1992 Governor's Award winner for Excellence in Science, Dr. Tim Shannon – Assistant Professor of Biology, and Mrs. Angela Castej – Administrative Assistant of Biology.

Awards were given in four categories, Grand, State, Regional and School Winners. A unique feature of the contest is that every school that participates is guaranteed at least one winner. The Grand Prizes went to 12 students from three regions who submitted the best overall papers. **Region I:** Whitney Sanders, K. of Grace Academy, Jessica Moore of Holly Springs Elementary, and Kelsey McNeil of Fork Shoals School, **Region II:** Afia Kahn of EL Wright, Abigail Tolar of LB Nelson Elementary, Mae Ellen of Brennen Elementary, Alyssa Broeker of Edisto Elementary, and Jonathan and Benjamin Bartlett of Renaissance Academy, **Region V:** Brittany Elk and Jessica Ford of Rollings Middle School, and Grace Westbury of Dorchester Academy. The above students are this year's Grand Prize Winners. Congratulations!

The contest scores were very good overall and a large percentage of the entrants qualified for an award. We had 161 winners out of 717 participants (approx. 23% of the total number of participants were winners). Certificates and prizes were mailed out to each student's principal so that the awards could be presented at each school's Awards Assembly. We congratulate each and every contestant for his or her fine efforts! We encourage every student in all South Carolina schools to participate next year. Below is a list of the winners, their prize, as well as their sponsor and school information.

rank	Winner	\$ Amt	SCHOOL	Reg	rank	Winner	\$ Amt	SCHOOL	Reg
<b>GRAND PRIZE WINNERS</b>									
6	Jessica Ford	\$100	Rollings Middle School	V	6	Elizabeth Nichols	\$50	Mid-Carolina Middle School	II
6	Afa Khan	\$100	E. L. Wright	II	6	Elizabeth Glenn	\$50	Banberg-Edward Middle School	I
5	Abigail Tolar	\$100	LB Nelson Elementary	II	4	Aaron Oswald	\$50	Yamville Elementary School	VII
4	Mae Ellen	\$100	Brennen Elementary School	II	4	Kerry Vaughn	\$50	Herbess Thorneil Elementary	I
5	Jessica Moore	\$100	Holly Springs Elementary	I	6	Thomas Orr	\$50	Philon Academy	I
5	Grace Westbury	\$100	Dorchester Academy	V	7	Joseph Zinna	\$50	Comish Academy Homeschool	II
4	Alyssa Broeker	\$100	Edisto Elementary School	II	3	David Halligan	\$50	Camden Middle School	II
4	Kelsey Michael	\$100	Fork Shoals School	I	3	Julie Beaks	\$50	Branchville High School	II
4	Jonathan Bartlett	\$100	Renaissance Academy	II	7	Jessica Kohl	\$50	Kohl Discovery School	V
5	Benjamin Bartlett	\$100	Renaissance Academy	II	3	Rebecca Evans	\$50	Deer High School	I
7	Brittany Elk	\$100	Rollings Middle School	V	3	Alice Chang	\$50	Rollings Middle School	V
6	Whitney Sanders, Jr.	\$100	Grace Academy	I	3	Colin Lawton	\$50	Hollywood Hall	II
					3	Trent Barnister	\$50	Belton Middle School	I
					3	Doreen MacPherson	\$50	McLessor School of Florence	IV
<b>STATE PRIZE WINNERS</b>									
5	Lavene Page, Jr.	\$75	Palmetto Middle Elementary	IV					
5	Adam Lippitt	\$75	Mossy Oaks Elementary	VII					
5	Jeremy Wu	\$75	The Wu Family Homeschool	II	6	Kathie Kunkle	\$25	Mid-Carolina Middle School	II
5	Cassidy Smith	\$75	Lockert Elementary School	II	6	Drew Ricard	\$25	Mid-Carolina Middle School	II
6	John Berthover	\$75	Cambridge Academy	I	6	Amy Cheng	\$25	Rollings Middle School	V
7	Anna Brenner	\$75	Mid-Carolina Middle School	II	4	Jacob Stokeman	\$25	Cambridge Academy	I
6	Jessica Chapman	\$75	Westview Middle School	V	4	Savannah Lanford	\$25	Cambridge Academy	I
6	Sean Bell	\$75	Stegg Middle School	V	4	Courtney Hayes	\$25	McCormick Elementary School	IV
7	Mary Adams	\$75	Cambridge Academy	I	3	Calab Smoak	\$25	Edisto Elementary School	II
					4	Katie Laven-Weeks	\$25	Fork Shoals Elementary School	I
<b>REGIONAL PRIZE WINNERS</b>									
4	Michael Whitney	\$50	Edisto Elementary School	VII	4	Branlon Young	\$25	McCormick Elementary School	IV
5	Matthew Hunter	\$50	St. Andrew's School of Matthews	V	6	Gaethon Garane	\$25	Brennen Elementary School	II
5	Joseph Hark	\$50	Sargents Intermediate School	V	6	Morgan Godines	\$25	Godines Academy	II
5	Will Green	\$50	Clinton Elementary School	I	4	Kyle Zoller	\$25	Rollings Middle School	V
7	Kristopher Morris	\$50	Richard Carroll Elementary	II	3	Carly Mayors	\$25	Cresview Elementary School	I
5	Dalton Porter	\$50	Faith Baptist School	I	4	Dale McMillan	\$25	Edisto Elementary School	II
5	Blake Little	\$50	Richard Winn Academy	II	4	Dike Porter	\$25	Faith Baptist School	I
5	Kelly Elliott	\$50	Palmetto Middle Elementary	IV	5	Sarah Coleman	\$25	Richard Winn Academy	II
6	Conor Hoffman	\$50	Hollywood Hall	II	5	Kayla Hess	\$25	Cresview Elementary School	I
4	Jeremy Odom	\$50	McCormick Elementary School	IV	4	Courtin Myers	\$25	Richard Winn Academy	II
5	Elizabeth Orr	\$50	Philon Academy	I	6	Leif Davis	\$25	Richard Winn Academy	II
5	Daniel Johnson	\$50	Ruby Elementary School	IV	6	Rebekah Todd	\$25	Diamond Hill Elementary School	I
5	Richard Weeks	\$50	Lennie B. Nelson Elementary	II	3	Jakala Johnson	\$25	Gilbes Middle School	II
6	Tom Ritchey	\$50	Belton Middle School	I	5	Layla Phillips	\$25	Edisto Elementary School	II
6	Alex Aggarwal	\$50	Lexington Middle School	II	6	Daria Light	\$25	Light Homeschool	V
5	Thomas Jones	\$50	Belton Homeschool	II	5	Andrew Anderson	\$25	St. Joseph's Catholic School	I
5	Ashari Ramella	\$50	Beach Hill Elementary School	V	3	Monica Mandaugh	\$25	Richard Carroll Elementary	II
					3	Taylor Proctor	\$25	Edisto Elementary School	II

Class	Winner	\$ Amt	SCHOOL	Reg	Class	Winner	\$ Amt	SCHOOL	Reg
<b>SCHOOL PRIZE WINNERS</b>									
4	Morgan Heds	\$25	Romana Elementary	II	6	Quita Simmons	\$25	Shelbyville Elementary	II
5	Meghana Rao	\$25	Montessori School of Florence	IV	4	Taylor Hunter	\$25	Shandon Elementary	II
6	Sarah Parks	\$25	Diamond Hill Elementary	I	4	Cassidy Bryant	\$25	Decaturville Elementary	I
4	Jed Sim	\$25	Round Top Elementary	II	5	Johns Taville	\$25	Macedonia Middle	V
5	Kendrick Brown	\$25	Richard Carroll Elementary	II	6	Jonathan Friedman	\$25	Hammond School	II
6	Sheldon Turner	\$25	Gilbes Middle School	II	6	Emily Wasserman	\$25	Hammond School	II
4	Palmer Reynolds	\$25	Round Top Elementary	II	5	Kristen Poppin	\$25	Homewood Elementary	IV
5	Sarah Williams	\$25	Richard Carroll Elementary	II	4	Brittany Evans	\$25	Family Christian Academy	V
6	Saverin Beekwith	\$25	Greer Middle School	I	5	Andrew Montalbano	\$25	SRI	V
6	Miles Whaley-Ashford	\$25	Gilbes Middle School	II	5	Megan Simmer	\$25	Pinecrest Elementary	I
4	Savannah Clark	\$25	Sedgefield Intermediate	V	6	Chelsea Ford	\$25	Rollings Middle School	V
6	Kelsey Clark	\$25	Sedgefield Middle School	V	6	Lindsay Wuerfel	\$25	Rollings Middle School	V
6	Marnise Hilton	\$25	Gilbes Middle School	II	6	Roxan Armstrong	\$25	Rollings Middle School	V
5	John Back	\$25	Killian Elementary	I	7	Jennifer Joseph	\$25	Westview Middle School	I
5	Lauren North	\$25	Saluda Elementary	II	7	Kaitlin McClure	\$25	Wanchville High School	II
6	Jessica Zinn	\$25	Cornish Academy Homeschool	II	7	Kaitlin Kennedy	\$25	Greig Middle School	V
4	Elizabeth Stanley	\$25	Varvills Elementary	VII	6	Koree Stingers	\$25	Greig Middle School	V
4	Joshua Ginn	\$25	Varvills Elementary	VII	7	Cole Mackey	\$25	Bates Middle School	II
4	Andie Davis	\$25	Varvills Elementary	VII	7	Amanda Perez	\$25	Cambridge Academy	I
5	Dusty Stewart	\$25	Holly Springs Elementary	I	8	Jacob Hoyt	\$25	Carson Middle School	II
5	Cassidy Henry	\$25	Lib. Nelson Elementary	II	8	Justin Eaddy	\$25	Carson Middle School	II
5	Dylan Goodwin	\$25	Hogood Elementary	I	7	Brandon Whitlins	\$25	Baton Middle School	I
	Tyler Pruitt	\$25	Sunriseville Elementary	V	7	Taylor Ritchey	\$25	Baton Middle School	I
5	Paul Lee	\$25	Moore Intermediate	IV	8	Kayla Brooker	\$25	Carver Ecksto Middle School	II
4	Alison Waldman	\$25	Harbison West Elementary	II	7	Jay Wilson	\$25	Cherokee Trail Elementary	I
5	Erika Carrillo	\$25	Saluda Elementary	II	7	Samantha Joe White	\$25	Covenant Christian School	II
5	Michael Gonzalez	\$25	Condor Elementary	II	8	Ashley Sowell	\$25	.S. Wight Middle School	I
5	Marcus Hamball	\$25	Center for Inquiry	II	7	Ma Ulmer	\$25	Clark Middle School	I
4	Martin Hollins	\$25	Ford Heights Elementary I	II	7	Betsy Hodge	\$25	Sauganee Middle School	V
5	Laura Sauer	\$25	Andrews Elementary	IV	7	Robert Yargelski III	\$25	Powers Middle School	I
6	Sara Jane Bush	\$25	Cherokee Trail Elementary	I	8	Shelby Stewart	\$25	Gilbes Middle School	II
6	Kelly Duncan	\$25	Newberry Middle School	II	8	Jessica Thompson	\$25	Marrington Middle School	V
4	Matthew Lewis	\$25	Sacred Heart Catholic School	II	6	Mehrab Khanjari	\$25	Cent Middle School	II
5	Ricky Smith	\$25	John C. Calhoun Elementary	I	6	Christopher Lewis	\$25	Sacred Heart Catholic School	II
6	Austin Westwood	\$25	Newberry Middle School	II	7	Jermi Gowdy	\$25	Rosemary Middle School	IV
5	Hannah Sauer	\$25	Spain Elementary	V	8	Austin Godines	\$25	Godines Academy	II
5	Yvette Jones	\$25	Condor Elementary	II	8	Braz Turner	\$25	Palmetto Middle/Elementary School	IV
4	Shirley Mathews	\$25	Covenant Christian School	II	7	Drew Dean	\$25	Hammond School	I
5	Andrew Shealy	\$25	Empire Academy Homeschool	II	6	Tamasha McIntyre	\$25	Greer Middle School	I
4	Viola White	\$25	Joseph Keels Elementary	II	7	Nicholas Montalbano	\$25	SRI	V
				7	Cassidy Sorrow	\$25	Diamond Hill Elementary	I	

Western MESAS Treasures Report 2005/2006

Date	Transaction	Expenditure	Balance
7 - 1 - 05			\$ 3,387.35
7-13-05	Deposit \$ 5.00		\$ 3,392.35
10-21-05		Dr. Pollard Furman Uni. \$ 25.00	\$ 3,367.35
11-01-05		SCAS Honarium \$ 880.00	\$ 2,467.35
11-02-05		M. Southgate \$ 100.00 10 books	\$ 2,367.35
11-14-05		USSM HUB 114.12 Worksh. Exp.	\$ 2,273.23
11-16-05	Entrance fee \$ 16.00		\$ 2,289.23
12-31-05	0 activities	0 activities	\$ 2,289.23
1 - 24 - 06		Austin Leavitt \$ 25.00	\$ 2,264.23
2-1-06 to 6-30-06	0 activities	0 activities	Balance remains \$ 2,264.23

There were no further activities performed and thus our Western Mesas account shows on June 30, 2006 a positive balance of \$ 2, 264.23

With this letter, I am sending you also the Western MESAS' June 2006 bank statement

Should you have any concerns or questions about this account, please feel free to contact me.

I will also send this statement to Rosemary, so she will be informed about the account as well.

Cordially

*Gabriela Gimenez*

Gabriela Gimenez

Sandhills MESAS Treasures Report 2006

**BB&T**

BB&T - SOUTH CAROLINA

STATEMENT DATE  
12-29-06

524-01-01-00 44501      0 C 001 30      50 02  
SCMESAS IV  
% TOM ROOP  
PO BOX 100547  
FLORENCE SC 29501-0547

0005128337786



IMPORTANT NOTICE OF PRICING CHANGE: EFFECTIVE FEB. 23, 2007, THE NON-SUFFICIENT FUNDS-OVERDRAFT FEE, AS LISTED IN THE PERSONAL AND BUSINESS PRICING GUIDE, WILL INCREASE FROM \$34 TO \$35.

CIVIC CHECKING-MM      ACCOUNT NUMBER      0005128337786

-----ACCOUNT SUMMARY-----

PREVIOUS BALANCE AS OF 11-30-06		975.31
0 DEPOSITS/CREDITS	.00+	
0 CHECKS PAID	.00-	
0 WITHDRAWALS/DEBITS	.00-	
SERVICE CHARGE	.00-	
<b>NEW BALANCE AS OF 12-29-06</b>		<b>975.31</b>

\*\*FOR ASSISTANCE, CALL (843) 664-1010 OR FOR BB&T PHONE24, CALL (800)BANKBBT (1-800-226-5228).

**OFFICIAL CHECK**

THE REPLACEMENT OF THIS DOCUMENT REQUIRES THE COMPLETION OF A BB&T DECLARATION OF LOSS

Check No. 0074500      78840410

January 8, 2007

0-2007113

**BB&T**

ISSUED BY: FIVE STAR EXPRESS COMPANY, INC.  
P.O. BOX 2476 WINDHAM, NH 03093  
DRAWN BY: BOSTON SAFE DEPOSIT & TRUST CO., BOSTON, MASSACHUSETTS

COPY NON NEGOTIABLE

BB&T 975 DOLS 31 CTS

*Anthony - I have closed the SCMESAS IV account and sent the check (\$975.31) to John Seftos. Since my retirement, there has been no activity in SCMESAS region IV. If a new director can be found, then perhaps MESAS activities may resume.*  
*Regards,*  
*Tom Roop*

**Other MESAS Regions:**

No 2006 reports

## South Carolina Science & Engineering Fairs 2006

As part of its commitment to improve science education, engineering and technology literacy in South Carolina, the South Carolina Academy of Science aids in the sponsorship of eight science fair regions. The South Carolina Academy of Science hopes its partnership with the regional science fairs through the Science Service organization will inspire today's youth to entertain new scientific ideas, create original technologies and bring a fresh perspective to the challenges facing our world. A summary of the eight Regional South Carolina Science Fairs is below. Reports of 2006 activities by region follow this summary information.

### IA. Upstate SC Region IA Science and Engineering Academic Competition

**Counties:** Abbeville, Greenville, Greenwood and Laurens

**Serves:** Students in grades 6-12 in two divisions: Junior - Grades 6-8 and Senior - Grades 9-12

**Web page:** [www.ropermountain.org](http://www.ropermountain.org)

**Deadline to Enter:** March 5, 2007

**Location for Competition:** Palmetto Expo Center, Greenville, SC

**DATES:** Monday & Tuesday, March 19 & 20, 2007 from 2-9PM.

**Location for Awards Ceremony:** Palmetto Expo Center

**AWARDS:** Monday, March 26, 2007 : Sends 1-2 teachers and up to 3 students to the Intel International Fair.

**SPONSORS:** Rotary Club of Greenville, Roper Mountain Science Center and the South Carolina Academy of Science

**Contact:** Mr. Greg Cornwell Roper Mountain Science Center; 402 Roper Mountain Road

Greenville, SC 29615; Ph: (864) 679-7002, Fax: (864) 679-7049. E-mail: [gcornwel@greenville.k12.sc.us](mailto:gcornwel@greenville.k12.sc.us)

### IB. Western/Upstate SC Region 1B Science Fair;

**Counties:** Anderson, Oconee, Pickens

**Serves:** Students in grades 6-12 in two divisions: Junior - Grades 6-8 and Senior - Grades 9-12

**Includes AOP Regional Elementary Science Fair** for Grades 4 and 5.

**Web page:** [www.aopscifair.org](http://www.aopscifair.org)

**Location for Competition:** Clemson University, SC

**DATES:** February 22, 2007 at Madren Center, Clemson, SC

**AWARDS:** March 15, 2007 at Brooks Center, Clemson University - Sends 1-2 teachers and up to 5 students to the Intel International Fair.

**SPONSORS:** Clemson University, Duke Power, South Carolina Academy of Science and Wal-Mart

**Contact:** Angela Foxx; AOP Regional Science Fair; PO Box 8083; Seneca, SC 29678;

Ph: 864-882-7739; e-mail: [SciFair@earthlink.net](mailto:SciFair@earthlink.net)

### IC. Central South Carolina Region II Science and Engineering Fair

**Counties:** Calhoun, Clarendon, Fairfield, Kershaw, Lexington,

Newberry, Orangeburg, Richland, Sumter

**Serves:** Students in grades 5-12 in three divisions: Junior - Grades 6-8; Senior - Grades 9-12; and Teams

**Web page:** [www.hrsm.sc.edu/jordan](http://www.hrsm.sc.edu/jordan)

**DATES:** March 23, 2007

**AWARDS:** Wednesday, March 28, 2007 Koger Center at USC Sends 2



teachers and up to 8 students to the Intel International Fair.

**SPONSORS:** USC's President's Office; Provost's Office; College of Arts & Sciences; College of Engineering; EPSCoR; College of Hospitality, Retailing and Sports Management; Sponsored Programs and Research; Division of Regional Campuses and Continuing Education; and The South Carolina Academy of Science sponsor the USC Central South Carolina Region II Science and Engineering Fair.

**Location for Competition:** Carolina Coliseum, University of South Carolina, Columbia, SC.

**Contact:** Dr. Don M. Jordan: E-mail: [jordan@gwm.sc.edu](mailto:jordan@gwm.sc.edu) Sumwalt Room 323, Science Education Center, CAS, USC,

Columbia SC 29208; Ph: (803) 777-7007; Fax: (803) 777-4396

### III. Piedmont Region III Science Fair

**Counties:** Cherokee, Chester, Spartanburg, Union, York and Lancaster  
**Serves:** Students in grades 1-4 (Elementary), 5-8 (Middle), and 9-12 (High School).

**Web page:** TBA

**Location for Competition:** USC Upstate, Hodge Gym, Spartanburg, SC

**Dates:** March 20-24, 2007

**Awards:** TBA 2007 in the Campus Life Center Ballroom - Sends 1 teacher and 2 students to the Intel International Fair.

**Sponsors:** USC Spartanburg and the Spartanburg Rotary Club

**Contact:** Dr. Lyle Campbell; USC Upstate; 800 University Way; Spartanburg, SC 29303

Ph: 864-503-5751, Fax: 864-503-5366; E-mail: [lcampbell@uscupstate.edu](mailto:lcampbell@uscupstate.edu)

### IV. Sandhills Region IV Science Fair

**Counties:** Chesterfield, Darlington, Dillon, Florence, Horry, Marion, Marlboro

**Serves:** Students in grades 6-12 in two divisions: Junior - Grades 6-8 and Senior - Grades 9-12

**Web page:** TBA

**Location for Competition:** Francis Marion University, Florence, SC

**Dates:** March 16-17 2007.

**AWARDS:** Sends 1-2 teachers and up to 5 students to the Intel International Fair ;

**Other Awards:** Gold, silver and bronze medals to 1st, 2nd and 3rd place winners in 13 Sr. and 7 Jr. categories; special awards and certificates of merit.

**SPONSORS:** Florence Civitan Club

**Contact:** Contact: Dr. Richard D. West - Dept. of Mathematics, Francis Marion University

Phone: 843-661-1579; E-mail: [rwest@fmarion.edu](mailto:rwest@fmarion.edu)

### V. Lowcountry Region V Science Fair

**Counties:** Berkeley, Charleston, Colleton, Dorchester, Georgetown

**Serves:** Students in grades 5-12 in two divisions: Junior - Grades 5-8 and Senior - Grades 9-12

**Web page:** TBA

**Location for Competition:** Omar Shrine Temple, Mt. Pleasant, SC

**Dates:** March 21, 2007.

**AWARDS:** April 6, 2007 - Physician's Auditorium, College of

Charleston Sends 1 teacher and 2 students to the Intel International Fair.

**SPONSORS:** Patriots Point Foundation Cold War Submarine Memorial Fund, College of Charleston, Charleston County School District, SC Sea Grant Consortium, Omar Shrine Center, Hamby Catering  
**Contact:** Starr Jordan, Director, Region V, College of Charleston, 66 George Street, Charleston SC 29424, Phone: 843-953-7847;E-mail: jordank@cofc.edu

**VI. Central Savannah River Area Region VI CSRA Science and Engineering Fair**

**Counties:** Aiken, Allendale, Bamberg, Barnwell, Edgefield, Hampton, McCormick, and Saluda counties in SC as well as some portions of Georgia  
**Serves:** Students in grades 4-12 in three divisions: Elementary Division 4-5; Junior Division 6-8;and Senior Division 9-12.  
**Web page:** www.CSRAScience.org  
**Location for Competition:** Augusta State University, Augusta, GA  
**Dates: No competition in 2007**  
**AWARDS: None in 2007** Sends 1-2 teachers and up to 5 students to the Intel International Fair.  
**SPONSORS:** CSRA Science and Engineering Fair, Inc.  
**Contact:** Richard A. Hane, Savannah River Technology Center Bldg. 703-45A Aiken SC  
Aiken, SC 29808; Voice: 803-725-5881, Fax: 803-725-8727; E-mail: richard.hane@srs.gov

**VII. Sea Island Region Science and Engineering Fair**

**Counties:** Beaufort and Jasper  
**Serves:** Students in grades 6-12 in three divisions: Middle School - Grades 6-8, Junior - Grades 9-10 and Senior - Grades 11-12.  
**Web page:** There will be a link through HHPrep.org in the early Fall.  
**Location for Competition:** Hilton Head Prep School, Hilton Head Island, SC  
**Dates: March 14, 2007:** Junior/Senior Division, **March 15th, 2007:** Middle School (Dates are tentative)  
**AWARDS: March 19, 2007** Sends 1-2 teachers and up to 5 students to the Intel International Fair.  
**SPONSORS:** Public and Private schools in Beaufort and Jasper Counties.  
**Contact:** Ms. Tina Webb-Browning, E-mail: Twebb@hhprep.org, Ph: 843-671-2286 x236, Fax: 843-671-7624 Hilton Head Preparatory School; 8 Fox Grape Road; Hilton Head, SC 29928

**VIII. South Carolina Independent School Association, Director TBA**

**Private SCISA member schools State Wide**

**Web page:** www.scisa.org

**Fair dates:** TBA 2007

**Location:** Orangeburg Preparatory School

**IX. SC ISEF Comm. Chr., Tina Webb-Browning**

**Contact:** Tina Webb-Browning, E-mail: Twebb@hhprep.org, Phone:(843)-671-2286 x236.

**Fair Dates:** ISEF, Albuquerque, NM, **May 13-19, 2007.**

**Web page:** www.sciserv.org

The **South Carolina Academy of Science** is a nonprofit organization running many entities in South Carolina such as Discovery Fair, Junior Academy Workshops and an Annual Meeting (forum for students to present papers). The Council of SCAS is staffed

by non-paid science and educational professionals from throughout South Carolina who volunteer thousands of hours annually to support the advancement of critical needs areas such as science, math and engineering for the benefit youth of South Carolina. Funds raised are totally used to support students research, awards and grants, and for travel expenses to the International Fair, as well as for many other national programs for students.

**Chairman, S.C. Science Fair Committee**

Ms. Tina Webb  
14 Sugaree drive  
Bluffton, SC 29425.  
Twebb@hhprep.org

**South Carolina Science & Engineering Fairs  
2005 Activity Reports**

**IA. Upstate SC Region IA Science and Engineering Academic  
Competition**

**52<sup>nd</sup> Annual Greenville County  
and South Carolina Regional IA  
Science and Engineering Fair 2006**

*Sponsored by Rotary Club of Greenville*  
Roper Mountain Science Center and The South Carolina Academy of Science  
Fair- March 14<sup>th</sup>, Public Exhibition - March 15<sup>th</sup> & Award Ceremony - March 21<sup>st</sup>  
Palmetto EXPO Center - Greenville, SC



**Senior Division – High Schools**

**THE CHARLES H. TOWNES STUDENT RESEARCH AWARD**

*Recognizing Academic Excellence in Research by a High School Student*

**HIEU TRAN - Southside High School**

**Individual Awards**

- First Place:** **Hieu Tran**, Southside High School, Teacher: Tom Rogers  
**"Interferometry with Radio Jove"**  
Award: Exhibitor at International Science Fair in May 2006, \$125 Cash, Trophy & Certificate, \$50 to teacher and school trophy recognizing student winner
- Second Place:** **Raymond Chassevent**, Lake View Academy  
Teacher: Ray Chassevent  
**"Sun-Catcher: An Automated Blind System"**  
Award: Exhibitor at International Science Fair in May 2006, \$100 Cash, Trophy & Certificate
- Third Place:** **Daniel DeMars**, St. Joseph's Catholic School,  
Teacher: Paul Barra  
**"Bio-Diesel: A Local Alternative to Mideast Oil"**  
Award: Observer at International Science Fair in May 2006, \$50 Cash, Trophy & Certificate
- Fourth Place:** **Jenny Labadorf**, Labadorf Home School,  
Teacher: Susan Labadorf  
**"How Long Will They Last? The Survival Rate of *Anax junius* Nymphs in Fecal Contaminated Water"**  
Award: \$100 Cash, Trophy & Certificate

## Team Awards

Student awards are for each team member.

<b>First Place:</b>	<b>Jay Hill &amp; Sahitya Jampana</b> , Southside High School Teacher: Tom Rogers      Award: \$100 Cash & Certificate, \$50 to teacher <i>"The Effectiveness of Radiation as a Form of Treatment for Termites"</i>
<b>Second Place:</b>	<b>Kiera Holland, Jake Laird &amp; Adam Shoun</b> , Southside High School Teacher: Tom Rogers      Award: \$75 Cash & Certificate <i>"The Tube"</i>
<b>Third Place:</b>	<b>Samantha Foster &amp; Kasey Stuart</b> , Eastside High School Teacher: Kathryn Brooks      Award: \$50 Cash & Certificate <i>"The Fight Against Tarnish"</i>
<b>Fourth Place:</b>	<b>Chris Bilamu, Zaphane Holland, Joe Mozell</b> , Eastside High School Teacher: Kathryn Brooks      Award: \$25 Cash & Certificate <i>"Take It to the Bank"</i>

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## Senior Division Special Awards

Amer. Soc. of Heating, Refrigerating & Air Conditioning Engineers (ASHRAE) - \$50 Cash Award & Certificate  
Raymond Chassevent, Lake View Academy, *"Sun-Tracker: An Automated Blind System"*

Amer. Institute of Chemical Engineers - \$50 Cash Award & Certificate  
Daniel DeMars, St. Joseph's Catholic School, *"Biodiesel: A Local Alternative to Mideast Oil"*  
Simon Heinze, Southside High School, *"Do the Chemical & Physical Properties of Spectachrome Particles Qualify Them as an Improved Tagging Method on Animals?"*

American Water Works Association - \$100 Savings Bond & Certificate  
Jenny Labadorf, Labadorf Home School, *"How Long Will They Last? The Survival Rate of Anax Junius Nymphs in Fecal Contaminated Water"*

Greenville Soil & Water Conservation District Award - \$50 Cash Award & Certificate  
Even Nelsen, Greenville High School, *"Fertilizer & Soil Conductivity"*

Greenville Master Gardeners - \$50 Cash Award and Certificate  
Jenny Labadorf, Labadorf Home School, *"How Long Will They Last? The Survival Rate of Anax Junius Nymphs in Fecal Contaminated Water"*

Herbert Hoover Presidential Library Association – Medallion & Certificate  
Raymond Chassevent, Lake View Academy, *"Sun-Tracker: An Automated Blind System"*

Intel Excellence in Computer Science – \$200 Cash award (mailed from INTEL) & Certificate  
Christopher Siden, Southside High School, *"Comparison of Artificial Intelligence Strategies for Forchess"*

RICOH Corporation – \$25 Cash Award, Certificate & Entry into Drawing for Digital Camera  
Raymond Chassevent, Lake View Academy, *"Sun-Tracker: An Automated Blind System"*

RMSC Astronomers Club - \$50 Cash Award & Certificate  
Hieu Tran, Southside High School, *"Interferometry with Radio Jove"*

Roper Mountain Science Center Team Effort Award - \$25 Cash Award & Certificate  
Jay Hill & Sahitya Jampana, Southside High School, *"The Effectiveness of Radiation as a Form of Treatment for Termites"*

Nathaniel Powers & Trevor Sloughter, Southside High School, *"Algae Growth in Alien Environments"*  
Patrick Beam & Nate Labadorf, Labadorf Home School, *"Can Robots Work Together Autonomously?"*

Sierra Club – \$50 Cash Award & Certificate  
Daniel DeMars, St. Joseph's Catholic School, *"Biodiesel: A Local Alternative to Mideast Oil"*

S. C. Council of Teachers of Mathematics – 1<sup>st</sup> \$50 Cash (mailed) & Certificate/2<sup>nd</sup> \$25 Cash (mailed) & Certificate  
First Place: Nicholas Chee, Southside High School, *"An Investigation of LED Lights"*  
Second Place: Simon Heinze, Southside High School, *"Do the Chemical & Physical Properties of Spectachrome Particles Qualify Them as an Improved Tagging Method on Animals?"*

South Carolina Society of Professional Engineers - \$100 Savings Bond (mailed) & Certificate  
Nicholas Chee, Southside High School, *"An Investigation of LED Lights"*

South Carolina Society of Professional Engineers - \$100 Savings Bond (mailed) & Certificate  
 Nicholas Chee, Southside High School, "An Investigation of LED Lights"

United States Air Force – Award Packet  
 Raymond Chassevent, Lake View Academy, "Sun-Tracker: An Automated Blind System"  
 Christopher Siden, Southside High School, "Comparison of Artificial Intelligence Strategies for Forchess"

United States Army – Polo Shirt & Certificate  
 Hieu Tran, Southside High School, "Interferometry with Radio Jove"  
 Raymond Chassevent, Lake View Academy, "Sun-Tracker: An Automated Blind System"

Jenny Labadorf, Labadorf Home School, "How Long Will They Last? The Survival Rate of Anax Junius Nymphs in Fecal Contaminated Water"  
 Yvonne Kao, Riverside High School, "Can the World's Food Shortage be Reduced by Physical or Chemical Treatments of Seeds of Agricultural Plants to Improve Yields from Growing Plants?"  
 Christopher Siden, Southside High School, "Comparison of Artificial Intelligence Strategies for Forchess"

United States Navy and Marine Corps – Award Packets Valued at \$50, Medal & Certificate  
 Even Nelsen, Greenville High School, "Fertilizer & Soil Conductivity"  
 Hieu Tran, Southside High School, "Interferometry with Radio Jove"

Vulcan Materials Company Geology Award - \$25 Cash Award & Certificate  
 Daniel DeMars, St. Joseph's Catholic School, "Biodiesel: A Local Alternative to Mideast Oil"

Yale Science & Engineering Association, Inc. – Certificate & Medallion (mailed)  
 Hieu Tran, Southside High School, "Interferometry with Radio Jove"

The sponsors and staff gratefully thank our  
 special award organizations for their commitment  
 to student participants in the Fair.  
 March 21, 2006



Reper Mountain Science Center



GREENVILLE COUNTY  
**SCHOOLS**  
 Where enlightening strives.



### Junior Division – Middle School Placement Awards

<b>Overall Individual Winners</b>			
	<b>First Place</b> - \$500 & a trophy, Teacher - \$250 and School trophy in honor of the student.	<b>Second Place</b> - \$250 and a trophy.	<b>Third Place</b> - \$75 and a trophy.
		<b>Fourth Place</b> - \$50 and a trophy	
First Place Overall:	<b>Darby Woodard, Mitchell Road Christian Academy</b> Project: "Pop Culture in Mice"	Teacher: Teresa Swiger	
Second Place Overall:	<b>Anna Chassevent, Lake View Academy</b> Project: "How Does Your Garden Grow? A Comparison of Two Growing Methods"	Teacher: Gail Chassevent	
Third Place Overall:	<b>Chelsea Roberts, Mauldin Middle School</b> Project: "Marvelous Motors"	Teacher: Elizabeth Stump	
Fourth Place Overall:	<b>Madison Vick, St. Mary's</b> Project: "The Reedy River: Clean or "Green?"	Teacher: Patricia Lanning	

**Category Winners** First Place: Gold Medal, \$50 to student, first place certificate, and \$25 to teacher  
 Second Place: \$25 & certificate; Third Place: \$15 & certificate; Fourth Place: \$10 & certificate

**Behavioral & Social Science**

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First Place	Jaci Foister <i>"Is the Glass Half Empty for One Sex and Half Full for the Other?"</i>	League Academy, Teacher: Sandra Hunt
Second Place	Kathryn Shumaker <i>"Do Age &amp; Gender Affect Short-Term Memory?"</i>	Mauldin Middle School
Third Place	Sarah Seal <i>"Do Vegetarians Live &amp; Eat Healthier Than Non-Vegetarians?"</i>	Mauldin Middle School
Fourth Place	Susanna Spearman <i>"Brain Food or Not, Here I Come"</i>	Blue Ridge Christian Academy

**Biology**

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First Place	Anna Chassevent <i>"How Does Your Garden Grow? A Comparison of Two Growing Methods"</i>	Lake View Academy, Teacher: Gail Chassevent
Second Place	Seth Klein <i>"Red Dye &amp; Its Effects on Mice"</i>	Blue Ridge Christian Academy
Third Place	David Harris <i>"Open Sesame"</i>	Blue Ridge Middle School
Fourth Place	James Brown <i>"Who Done It?"</i>	Tanglewood Middle School

**Chemistry**

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First Place	Kelsey Traunero <i>"Chemical Analysis of Aspirin to Determine Effectiveness"</i>	Northwood Middle School, Teacher: Delores Brown
Second Place	Derek Neisen <i>"Diffusion Conclusion"</i>	League Academy
Third Place	Langston Corn <i>"Alternative Fuels"</i>	Hughes Academy
Fourth Place	Lauren Childers <i>"Stomach Savers"</i>	League Academy

**Engineering**

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First Place	Sam Ashmore <i>"Homemade Hovering"</i>	Mitchell Road Christian Academy, Teacher: Teresa Swiger
Second Place	Ryan Bondura <i>"Solar Man"</i>	St. Mary's
Third Place	Steven Pasternak <i>"Was That Upgrade Really Worth It?"</i>	Mitchell Road Christian Academy
Fourth Place	Caelan Burris <i>"Vive la Resistance: The Effects of Wire Size &amp; Type on Resistance"</i>	Mitchell Road Christian Academy

**Environmental Science**

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First Place	Madison Vick <i>"The Reedy River: Clean or 'Green'?"</i>	St. Mary's, Teacher: Pat Lanning
Second Place	Mary Burgess <i>"How's it Growing?"</i>	Blue Ridge Middle School
Third Place	Haley Hickey <i>"Cooling Point"</i>	Tanglewood Middle School
Fourth Place	Kenyatta Fuller <i>"The More the Merrier?"</i>	Tanglewood Middle School

**Medicine & Health**

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First Place	Darby Woodard <i>"Pop Culture in Mice"</i>	Mitchell Road Christian Academy, Teacher: Teresa Swiger
Second Place	Katherine Gardner <i>"Breaking the Sound Barrier"</i>	Mauldin Middle School
Third Place	Dylan Walpole <i>"Acid Neutralized?"</i>	Mitchell Road Christian Academy
Fourth Place	Lucas Walker <i>"The Refrigerator Water Dispenser: A Haven for E. coli?"</i>	Walker Home School

**Physics**

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First Place	Chelsea Roberts <i>"Marvelous Motors"</i>	Mauldin Middle School, Teacher: Elizabeth Stump
Second Place	John Greene <i>"What Angle of Attack Creates A Greater Lift?"</i>	Mauldin Middle School
Third Place	Ashley Roberts <i>"The Castle Catapult"</i>	Mauldin Middle School
Fourth Place	Ryan Stavrakas <i>"Do You Ski Like I Ski?"</i>	St. Mary's

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<b>Team Winners</b>	Student Awards are for each team member. <b>First Place</b> - \$100, Teacher - \$50. <b>Second Place</b> - \$75. <b>Third Place</b> - \$50. <b>Fourth Place</b> - \$25
First Place Team:	<b>Braden Brownlee &amp; Ashton Van Horne</b> , Laurens Middle School Project: <b>"Bacteria in Water"</b> Teacher: Teresa Tollison
Second Place Team:	<b>Clark Dean &amp; Hunter Smith</b> , Laurens Middle School Project: <b>"Bullet Drop"</b> Teacher: Teresa Tollison
Third Place Team:	<b>Michael D'Onofrio &amp; Matthew Fourspring</b> , Northwood Middle School Project: <b>"Short Term Memory &amp; Age"</b> Teacher: Peggy Shealy
Fourth Place Team:	<b>Daniela Perez, Emma Tillman &amp; Kaila Woodson</b> , Northwood Middle School Project: <b>"How Much Oxygen"</b> Teacher: Laurie Anderson

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## Junior Division - Special Awards

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**American Meteorological Society - \$25 Cash Award & Certificate**  
Clara Thompson, Tanglewood Middle School, "Ice, Ice Baby"

**American Psychological Association - \$25 Cash Award & Certificate**  
Jaci Foister, League Academy, "Is the Glass Half Empty for One Sex and Half Full for the Other?"

**Amer. Society of Heating, Refrigerating & Air Conditioning Engineers (ASHRAE) - \$25 Cash Award & Certificate**  
David Pollard, St. Mary's, "Which Solar Collector is Best?"

**American Institute of Chemical Engineers (AIChE) - \$50 Cash Award & Certificate**  
Eric Roper, League Academy, "Fruit Power"

Mark Schott, St. Mary's, "Fuel Mixtures"

**American Water Works Association Excellence in Water Award - Plaque**  
Ryan Snow, Laurens Middle School, "What Materials Work Best in a Sandbag for Blocking Floodwaters?"

**ASM International Foundation - Medal (to be mailed) & Certificate**  
Megan Heijer, St. Mary's, "The Best Insulating Material"

**Association for Women Geoscientists - \$25 Cash Award & Certificate**  
Madison Vick, St. Mary's, "The Reedy River: Clean or "Green"?"

**Clemson Excellence in Earth Science Award - Book, Annual Pass to Campbell Geo. Museum, Poster & Certificate**  
Madison Vick, St. Mary's, "The Reedy River: Clean or "Green"?"

**Greenville County Medical Society Alliance Award - \$50 Cash Award & Certificate / \$25 Teacher**  
Meghan Ballenger, Tanglewood Middle School, "Do Animals Affect Blood Pressure in Nursing Home Residents?"  
Teacher: Deborah Pearson  
Dylan Walpole, Mitchell Road Christian Academy, "Acid Neutralized?" Teacher: Teresa Swiger  
Darby Woodard, Mitchell Road Christian Academy, "Pop Culture in Mice", Teacher: Teresa Swiger  
Ryan Hurst, Mauldin Middle School, "Iron in the Man", Teacher: Rebecca Waters

**Greenville Family Partnership - \$25 Cash Award & Certificate**  
Kelly Howard, St. Mary's, "Candy or Medicine?"  
Holly Pelanda, Mauldin Middle School, "Medicine or Candy?"

**Greenville Master Gardeners - \$25 Cash Award & Certificate**  
Lauren Tackett, Blue Ridge Middle School, "Polluted Plants Propose Perplexing Problems"

**Greenville Soil & Water Conservation District Award - \$50 Cash Award & Certificate**  
Madison Vick, St. Mary's, "The Reedy River: Clean or "Green"?"

**International Society for Optical Engineers - \$25 Cash Award & Certificate**  
Averie Wood, Ware Shoals Jr. High, "Picture It"

**National Society of Professional Engineers - \$25 Cash Award, Pin & Certificate**  
Sam Ashmore, Mitchell Road Christian Academy, "Homemade Hovering"

**NOAA - \$25 Cash Award & Certificate**  
Ryan Snow, Laurens Middle School, "What Materials Work Best in a Sandbag for Blocking Floodwaters?"

**Roper Mountain Team Effort Awards –\$25 Cash Award & Certificate**  
Braden Brownlee & Ashton Van Horne, Laurens Middle School, "Bacteria in Water"  
Clark Dean & Hunter Smith, Laurens Middle School, "Bullet Drop"

**Sierra Club - \$50 Cash Award & Certificate**  
Brittney Eaton, Blue Ridge Middle School, *The Cardboard Chair: A New Way to Recycle*"

**S. C. Council of Teachers of Mathematics – \$50 Cash (mailed) & Certificate**  
Caelen Burris, Mitchell Road Christian Academy, *"Vive le Resistance: The Effect of Wire Size & Type on Resistance"*

**S. C. Science Council – \$100 Cash Award & Certificate**  
Darby Woodard, Mitchell Road Christian Academy, *"Pop Culture in Mice"*

**South Carolina Society of Professional Engineers - \$100 Savings Bond & Certificate**  
Caelen Burris, Mitchell Road Christian Academy, *"Vive le Resistance: The Effect of Wire Size & Type on Resistance"*

**United States Air Force Awards –Award Packet**  
Mark Schott, St. Mary's, *"Fuel Mixtures"*  
Jaci Foister, League Academy, *"Is the Glass Half Empty for One Sex and Half Full for the Other?"*

**U.S. Metric Association, \$25 Cash Award & Certificate**  
Ryan Stavrakas, St. Mary's, *"Do You Ski Like I Ski?"*

**United States Navy/Marine Corps – Award Packet**  
Kelsey Traunero, Northwood Middle School, *"Chemical Analysis of Aspirin to Determine Effectiveness"*  
Ryan Hurst, Mauldin Middle School, *"Iron in the Man"*  
Anna Chassevent, Lake View Academy, *"How Does Your Garden Grow? A Comparison of Two Growing Methods"*

**United States Dept. of Health and Human Services Award – \$25 Cash Award and Certificate**  
Darby Woodard, Mitchell Road Christian Academy, *"Pop Culture in Mice"*

**Vulcan Materials Company Geology Award - \$25 Cash Award & Certificate**  
Madison Vick, St. Mary's, *"The Reedy River: Clean or "Green"?"*

### **Discovery Young Scientist Challenge Awards**

#### ***A National Competition Sponsored by the Discovery Channel***

*Winners receive a DYSC 2006 lapel pin and certificate and a nominee information sheet for national competition.*

Ryan Bondura	St. Mary's	"Solar Man"
David Harris	Blue Ridge Middle	"Open Sesame"
Seth Klein	Blue Ridge Christian	"Red Dye and its Effects on Mice"
Derek Nelsen	League Academy	"Diffusion Conclusion"
Steven Pasternak	Mitchell Road Christian	"Was That Upgrade Really Worth It?"
Chelsea Roberts	Mauldin Middle	"Simple Motors"
Sarah Seal	Mauldin Middle	"Do Vegetarians Eat & Live Healthier than Non-Vegetarians?"
Ryan Stavrakas	St. Mary's	"Do You Ski Like I Ski?"
Madison Vick	St. Mary's	"The Reedy River: Clean or "Green"?"
Lucas Walker	Walker Home School	"The Refrigerator Water Dispenser: A Haven for E. coli?"
Darby Woodard	Mitchell Road Christian	"Pop Culture in Mice"

**The sponsors and staff gratefully thank our special award organizations for their commitment to student participants in the Fair. March 21, 2006**





## **IB. Western/Upstate SC Region IB Science Fair**

*NO 2006 ACTIVITIES REPORT RECEIVED*

## **II. Central South Carolina Region II University of South Carolina Science and Engineering Fair**

### **2006 SUMMARY OF WINNERS**

By Dr. Don M. Jordan, Director

The University of South Carolina hosted the Central South Carolina Region II Science & Engineering Fair on March 31, 2006. Students from nine counties (listed above) competed for over \$30,000.00 in scholarships, savings bonds, and trip awards.

Seven hundred and six (706) students and one hundred fifty-three (153) teachers participated in the fair, which included 77 Schools, (62 Middle / Elementary Schools and 15 high schools). The students were selected by over Two Hundred and fifty (250) judges comprised of College Professors, Medical Scientists, U.S. Army, Marine, and Air Force Officers, as well as Business Leaders from the Midlands Community. Awards were available in 52 major categories, such as Engineering, Women in Science, Vision Science, Chemistry, etc. Most awards had Junior, Senior, and Team subcategories, often with 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and Honorary Mention standings awarded. There were a total of 197 awards given among those varied categories and standings. Students with very good projects had a possibility of winning awards in one or more categories. There were best overall standings for grades 5-12, as well as for best individual Junior Division, Senior Division and Team Division projects.

Participation in science fairs on the local, regional, and national/international levels presents opportunities to students for travel and interaction with scientists from both academic and industrial backgrounds. The next level of competition is at the **International Science and Engineering Fair (ISEF)**, which is held annually and features the best regional/national student projects from around the world. Our regional judges selected six students and three teachers to be in the Official Party to represent South Carolina at ISEF in Indianapolis, Indiana, May 7-13, 2006.

**The University of South Carolina**, with support from the **South Carolina Academy of Science**, sent the following students to **ISEF**: Grand Prize Team Senior Division winners, **Minru Wong and Abigail Khushf** of Dreher High School, Grand Prize Female Senior Division winner **Gina Noh** and Grand Prize Male Senior Division winner **Graham Van Shaik** of Spring Valley High School. Students to be sent as official observers are **James Cunningham** of Spring Valley High School and **Kristen McLaurin** of Dent Middle School. USC will send **Lisa McAlpine** and **Dale Soblo** of Spring Valley High School to lead the official ISEF party for the State of South Carolina. In addition, **Judith Ray & David Nelson** of Dreher High School will be teacher leaders and mentors for the USC Region II. The above six students will be representing South Carolina at the International Science and Engineering Fair May 7 – 13, 2006 at Indianapolis, Indiana. A report on their success will be added to this summary. In addition, students **Asif Khan and John Hodge** of Spring Valley High School, **Emily Neller-moe and Katherine Anne Colburn** of Spring Valley High School won Male and Female 2<sup>nd</sup> & 3<sup>rd</sup> place winners.

Last year at Intel ISEF (2005), **Patrick Hankins** placed third in the Chemistry Division at the international fair. To win, he had to endure nine hours of judging in which he spoke to approximately fifteen judges and then an additional four hours of presentation to the general public. Placing third in a fair of this magnitude is a huge accomplishment for the high school senior since he had to compete with 96 other competitors in his region which includes not only the best of the US, but also Germany, Brazil, Japan and other countries. His project was titled, "pH-Triggered Assembly of Gold Nanorods," and dealt with a major problem of current nanoscience research in trying to control

how nanoparticles orient themselves in varying conditions. He conducted the bulk of his research at the University of South Carolina under Dr. Catherine Murphy. His school sponsor was Irmo Science Team coach Mr. Stephen Orr. Patrick will be enrolling in the Honors College of the University of South Carolina this fall as a Carolina Scholar.

**DISCOVERY CHANNEL YOUNG SCIENCE CHALLENGE / HISTORICAL CHANGES/**  
We have worked hard in the past seven years to strengthen the USC Central South Carolina Science & Engineering Fair. We made it possible for sixth graders to become eligible for the Region II Science & Engineering Fair in 1996. We re-introduced Team Projects in 1997 - the first time in four decades for Region II! In 1999, we lowered the grade limit to enable fifth-grade students in the nine-county region to become eligible. We did this because Science Service of Washington, D.C. had contracted with Discovery Channel Inc., to create what has become essentially the ISEF for students in grades 5-8 (ISEF is restricted to grades 9-12). We nominated 60 middle school students to compete in DYSC in 2006. DYSC nominees receive national recognition from Science Service that includes an honor certificate, a DYSC T-shirt, a lapel pin recognizing their achievement and an entry form to compete with 6,000 other students at the international level.

**Last year (2005) Eleven (11) Students Seven (7) from the Midlands were chosen by the Discovery Channel Young Scientist Challenge (DCYSC) as semifinalist (400 nation-wide).** These students have the knowledge, enthusiasm and imagination to become the scientific trailblazers of tomorrow," said Judith A. McHale, President and CEO, Discovery Communications. The breadth and knowledge demonstrated by the 400 semifinalist is inspiring and sets an example for anyone with wants to explore the world around them. The eleven semifinalist from the State of South Carolina are: Emily Ann Eisenstadt (Grade 8) Crayton Middle School, Teacher: Vicki Brown; Spencer Bennett Skelley (grade 7) Crossroads Middle School Teacher: Linda Durstine; Trevor Warren Auman (grade 8), Teacher: Susan Yelton; Chandler Matthew Barton (grade 8) Teacher: Susan Yelton, and Rachitha Rajan (grade 8) Teacher: Susan Yelton all from Dent Middle School; Velina Roumenova Kozareva (grade 5) Harbison West Elementary School Teacher: Angel Norris; Grace Carroll Zimmermann (grade 5) St. Joseph School Teacher: Frances Goodrich (All Seven From Region II) Others in South Carolina are: Erika Lynn Mino (grade 5) Pelham Road Elementary School Anne Virginia Cai (grade 7) Porter-Gaud School; Seth Gaston Shelton (grade 8) D. R. Hill Middle School, and Brandon N. Baker (grade 7) McCants Middle School

**USC Region II Winners of Grand Awards Junior Division**

**Destry Jones** (Crayton Middle School, Sponsor **Andrea Karaffa**) research project entitled *Mutations: They Don't Always Add Up*, won First Place. **Arjun Aggarwal**, (Lexington Middle School, Sponsor **Preveen Aggarwal**) research project entitled *Can the Concept of Stereo Vision Be Applied in Robotics?*, won Second Place. **Kristen McLaurin** (Dent Middle School, Sponsor **Susan Yelton**) project entitled *Measuring Memory: A study of Brain Dominance and Memory*. Also there were seven Honorable Mentions for best Junior Division Best Project. In addition out of over 500 junior division participants from nine counties. The above three grand awards winners join fifty five (60) additional students that will represent South Carolina in the **Discovery Channel Young Science Challenge (DCYSC)** during the summer of 2006.

**USC Science & Engineering Fair tours for Science Fair Students**

The University of South Carolina sponsored five active and hands-on tours on March 31, 2006 for High School Students and Middle School Students who advanced to the

USC Region II Science & Engineering Fair. The tours were scheduled between 12:30 PM to 5:30 PM on the afternoon of March 31, 2006.

**Tour # 1: Geographic Information Systems (GIS):** *Tour Hosted by the U.S.C. College of Liberal Arts / Dept of Geography presented by Kevin Remington, GIS Coordinator.*

**Tour # 2: USC School of Medicine: Careers in the Health Professions,** Richard A. Hoppmann, M. D. Associate Dean for Medical Education and Academic Affairs. *Pathology/Plastinated Human Specimens* Tim Sullivan, Ph.D. Department of Pathology and Microbiology.

**Tour # 3: Electron Microscopy Center:** *Hosted by Dana G. Dunkelberger. The Electron Microscopy Center is the university system's centralized analytical microscopy and imaging center. Our world class facility has over \$3 million worth of state-of-the-art instrumentation capable of analyzing the structure and elemental composition of materials. The tour included a demonstration and discussion of the capabilities of our Room-size transmission and scanning electron microscopes.*

**Tour # 4: Super Conductivity and Magnetism, Low Temperature Laboratory:** Sponsored by the College of Arts & Science: Hosted by Dr. David Tedeschi of the Physics Department. This tour featured demonstrations and activities in low temperature physics and magnetism for all grade levels. The astronomy center showcased the use of computers for research and teaching. In addition, the astronomy center made a telescope available for public solar viewing.

**Tour # 5: College of Engineering & Information Technology: Mini Baja Dune Buggy Demonstration** Hosted by Susan Jarvie, Department of Mechanical Engineering. *Robotics* presented by Department of Electrical Engineering.

**The "WE COULDN'T DO IT WITHOUT YOUR 'AWARDS!'"**

Many dedicated people provide much-needed support for the USC Region II Science & Engineering Fair.

**These people make it possible! Special thanks go to:**

**President Dr. Andrew Sorensen**  
Office of the President

**Provost Mark Becker**  
Office of the Provost

**Dean Duncan Buell**  
College of Engineering

**Dean Mary Anne Fitzpatrick**  
College of Arts & Sciences

**Dr. Scott Little**  
EPSCOR Office

**Dean Chris Plyler**  
Regional Campuses & Continuing Ed

**Dr. Harris Pastides**  
VP for Research  
University of South Carolina

**Dean Patricia Moody**  
College of Hospitality  
Retail & Sport Management

**Marie McGehee**  
**Colonial Supplemental Insurance**  
Sponsor – 2006 Judges Dinner

**Dr. Larry R. Faulkner**  
VP Med Affairs & Dean  
USC School of Medicine

**Dean Mary Ann Parsons**  
College of Nursing

Sincerely,



Don M. Jordan, Ph.D.  
Director, USC Region II Science & Engineering Fair.

### III. Piedmont Region III Science Fair

The SC Piedmont Region III Science Fair awards ceremony was held April 1. Numbers of ISEF-eligible students were very low (10), and our judges ruled that none of the projects were suitable to send to ISEF. Our Fair hosts Elementary, Middle School, and Senior High competition. Of 482 projects in the Middle School competition, 34 were nominated for the Discovery Channel Young Scientist Challenge. We had 414 projects from the grades 1-4. Over 60 public and private schools participated.

### IV. Sandhills Region IV Science Fair

*NO 2006 ACTIVITIES REPORT RECEIVED*

### V. Lowcountry Region V Science Fair

#### General Information

The 26<sup>th</sup> annual Lowcountry Regional Science and Engineering Fair was held March 20 at the Omar Shrine Center, Mt. Pleasant, SC. The Lowcountry Science Fair is open to students in grades 5-12 in Berkeley, Charleston, Colleton, Dorchester, and Georgetown counties. There were 147 students presenting 119 projects, representing five high schools and seven elementary/middle schools. The student demographics are shown in Tables 1 and 2. At the 2005 Lowcountry Science Fair, 147 students presented 134 projects and represented four high schools and eight middle schools.

Caucasian	119
African-American	20
Asian	3
Hispanic	2
Middle Eastern	1
Not Provided	2

*Table 1 - Ethnicity of Students*

Female	75
Male	72

*Table 2 - Gender of Students*

The Lowcountry Science Fair is an affiliate of the Intel International Science and Engineering Fair (ISEF) and abides by their rules and regulations. This year, projects are divided into the following categories, Behavioral and Social Sciences, Biological Sciences (includes botany, microbiology, and zoology), Chemistry and Biochemistry, Engineering, Geology and Environmental Science (includes earth and environmental science), Mathematics and Computer Science, Medicine and Health, Physics and Astronomy (includes physics and space science), and Team Projects. All categories were represented with projects. First, second and third place awards were given in each category for Senior and Junior Divisions (if applicable) as well as numerous special awards. There were approximately 60 judges from various organizations, College of Charleston, MUSC, The Citadel, and local businesses.

### Awards Ceremony and Overall Winners

The Awards Ceremony was held Wednesday, March 22 at the College of Charleston's Physicians Auditorium. Approximately 75 students received awards.

Overall first, second and third place winners in each division were awarded \$100, \$75 and \$50 savings bonds respectively. The teachers of the first place overall winners in each division were awarded a \$100 savings bond as well. The first and second place overall winners in the senior division, as well as the teacher of the first place winner, were provided an all-expenses paid trip to the ISEF in Indianapolis, Indiana.

The Junior Division first place winner was Helen Olmi, a seventh grade student from Porter Gaud. Her project in the Physics and Astronomy category was titled "Dive In." Her teacher is Ms. Gretchen Hay.

The Senior Division first place winner was Benjamin Hamner with his project in the Mathematics and Computer Science category, "The Evolution of Operant Conditioning and Cooperation in Delayed Gratification Games." The Senior Division second place winner was Nicolas Wiles with his project in the Engineering category, entitled "Designing an Aircraft for the Future of Air Travel." Benjamin and Nicolas are seniors at Academic Magnet High School and students of Mr. Bruce Newton.

At the 2006 ISEF, held May 8-12, Benjamin Hamner won one of 14 first awards given by the US Air Force. His award included a \$3000 cash prize. Almost 1,500 students from 47 countries competed for nearly \$4 million in scholarships and prizes at the 57th ISEF.

### Sponsors

Sponsors of the LSF include the Patriots Point Foundation Cold War Submarine Memorial Fund, College of Charleston School of Sciences and Mathematics, Lowcountry Hall of Science and Math, Omar Shrine Center, and Hamby Catering.

## **VI. Central Savannah River Area Region CSRA Science and Engineering Fair**

*NO 2006 ACTIVITIES REPORT RECEIVED*

## **VII. Sea Island Region VII Science and Engineering Fair**

### **Middle Division (Grades 6-8) Grand Award Winners**

#### **Team & Individual**

- 1<sup>st</sup> Haynes Werner, Grade 8, Beaufort Academy- *Thyrothorus ludovicianus* Sings the Greatest Hits of 2006  
Observer to The Intel® International Science and Engineering Fair-  
Indianapolis, Indiana
- 2<sup>nd</sup> Charlotte Westcob, Grade 8, Beaufort Academy – Rock My World?
- 3<sup>rd</sup> Hannah Werner, Grade 8, Beaufort Academy – Troubled Waters
- 4<sup>th</sup> Taylor Clark & Kathleen Blum, Grade 7, Hilton Head Prep School –  
We Be Burnin'
- 5<sup>th</sup> Alex Couch, Grade 6, Hilton Head Middle School – Dirt Cheap
- 6<sup>th</sup> Marian Matney, Grade 6, Hilton Head Prep School - Fabricology

### **Junior Division (Grades 9-10) Grand Award Winners**

#### **Individual**

- 1<sup>st</sup> Ryan Clark, Grade 10, Hilton Head Prep School - Utilizing Ultrasonic Activation to Prevent the Adhesion of the *Balanus glandula* Within the Maximum Radius
  - o Competitor at Intel® International Science and Engineering Fair – Indianapolis, IN
- 2<sup>nd</sup> Graham Gintz, Grade 10, Hilton Head Prep School- Optical, Acoustic, and Mechanical Properties of StealthWear®
  - o Competitor at Intel® International Science and Engineering Fair – Indianapolis, IN
- 3<sup>rd</sup> Katie Stine, Grade 9, Hilton Head Prep School – BeeHave Phase 2: Sight vs. Scent
  - o Observer at Intel® International Science and Engineering Fair – Indianapolis, IN
- 4<sup>th</sup> Andrew Ryan, Grade 10, Hilton Head Prep School – Burning Fuels
  - o Observer at Intel® International Science and Engineering Fair – Indianapolis, IN

#### **Team**

- Colby Foss and Elle Czura, Grade 9, Hilton Head Prep School – Electrobeans
  - o Competitors at Intel® International Science and Engineering Fair – Indianapolis, IN

### **Senior Division (Grades 11-12) Grand Award Winners**

#### **Individual**

- Alex Mavrogordato, Grade 12, Hilton Head Prep School-Pressure Braking: Phase II
  - o Competitor at Intel® International Science and Engineering Fair – Indianapolis, IN
- Emily Termotto, Grade 11, Hilton Head Prep School – Are You Sure that You Want to Drink That? Part II
  - o Competitor at Intel® International Science and Engineering Fair – Indianapolis, IN

#### **Team**

- Chelsey Webb, Alexandra Smith, and Skyler Griffin – Grades 11 and 12, Hilton Head Prep School - A Comparative Analysis of Laser Efficiency: The Effect of Scattering Surfaces Inside a Diffuse Reflector Solid State Laser Pump Chamber
  - o Competitors at Intel® International Science and Engineering Fair – Indianapolis, IN

### **Other Significant Awards**

#### **Discovery Young Scientist Challenge Semifinalist**

- Haynes Werner, Grade 8, Beaufort Academy- *Thyrothorus ludovicianus* Sings the Greatest Hits of 2006

**Intel® International Science and Engineering Fair 2006 Award Winners**

- **4<sup>th</sup> Place Grand Award** - Graham Gintz, Grade 10, Hilton Head Prep School- Optical, Acoustic, and Mechanical Properties of StealthWear®
- **3rd Award United States Coast Guard** - Ryan Clark, Grade 10, Hilton Head Prep School - Utilizing Ultrasonic Activation to Prevent the Adhesion of the *Balanus glandula* Within the Maximum Radius

**Sea Island Regional Science Fair 2007**

The Sea Island Regional Science Fair will once again be held at Hilton Head Preparatory School. The Junior and Senior Division Fairs (grades 9-12) will be held on March 14, 2007. Set-up will be completed the evening prior to the fair. Project judging will begin at 9:30am on the 14<sup>th</sup>. Project take down will be completed immediately following judging. The Middle School Fair will be held on March 15<sup>th</sup>. Set-up for this fair will begin at 8:00am on the 15<sup>th</sup>. All set-up must be complete by 9:00am. Project judging will begin at 9:00am. Take-down will be completed immediately following this fair. All awards will be announced on Monday, March 19<sup>th</sup>. This regional science fair is open to all students in grades 6-12 in Beaufort or Jasper County.

**VIII. Independent School Association**

*NO 2006 ACTIVITIES REPORT RECEIVED*

**IX. South Carolina International Science and Engineering Fair**

Director:

Tina Webb-Browning, E-mail: Twebb@hhprep.org,  
Phone:(843)-671-2286 x236.

## 2006 Discovery Channel Young Scientist Challenge DCYSC Awarding Nominees at our Fair

The Discovery Young Scientist Challenge is intended to discover and reward the top 10% of the middle school participants (5<sup>th</sup>- 8<sup>th</sup> graders) who have conducted sound scientific research and who are able to best communicate about science.

### Eligibility

1. Nominee(s) must be in the 5<sup>th</sup>- 8<sup>th</sup> grade when they compete at our fair.
2. Nominee(s) must place in your fair's category judging (1<sup>st</sup>- 4<sup>th</sup> place).

### Guidelines

The following guidelines are provided to aid in your selection of your nominees:

- Individuals and team are eligible for consideration. Each team member should be considered as one selection (i.e. a team of 3 will take 3 of your selections).
- Nominations will be chosen from all grade levels.
- Judging will occur during our regular category judging.

### The Prize

- Each nominee will receive a certificate of recognition, a t-shirt and a lapel pin as a prize at the Region II Fair for becoming a DCYSC Nominee. Nominees will also receive a DCYSC 2006 Entry Booklet that may be completed to enter the next phase of the competition.
- Entrants to the DCYSC compete to become one of 400 Semifinalists who each receive \$25 Discovery gift certificate and a certificate of recognition. Forty of the 400 semifinalists will be named of the Finalists and will come for an all-expense paid trip to Washington, DC in October 2006 to compete for a share of over \$40,000-the top winner will win a \$15,000 college scholarship.
- If the winning student chooses to enter the next phase of competition, he or she will need to complete an entry booklet by the early June 2006 deadline. Entries are judged on the scientific merit, originality, and communication of the project and the essays.

### Judging Criteria: (100 point scale)

#### 1. Visual and written presentation (25)

- a. Does the display board and written materials demonstrate the students(s) understanding of the research?
- b. Is the material presented in a logical, orderly manner that is easily interpreted?

#### 2. Interaction with judges (oral presentation): (75)

- a. Is the student(s) able to explain his/her project and the underlying science it involves logically and concisely?
- b. Does the student(s) demonstrate an understanding of the limitation of his/her research? Can the student provide possible ideas for furthering the research?
- c. Is the student comfortable in conversing about their project and science?

**To learn more about the competition, please go to [www.sciserv.org/dydc](http://www.sciserv.org/dydc) or  
[www.discovery.com/dcyc](http://www.discovery.com/dcyc)**



### **THE MIDLANDS FINEST 2006**

Sixty (60) Students from the Midlands were nominated by the International Science & Engineering Fair to compete nationwide this summer with other states in **THE 8<sup>TH</sup> ANNUAL DISCOVERY CHANNEL YOUNG SCIENTIST CHALLENGE**

Discovery Communications, Inc., nominated 60 of the Midlands finest to compete in the 2006 Discovery Channel Young Scientist Challenge (DCYSC). As the nation's premier science contest for students in grades 5-8, DCYSC celebrates and encourages science excellence among America's youth, at an age when many begin to lose their interest in the field.

400 students will be selected from different regions around the United States by DCYSC judges as semifinalist for his/her project during the summer of 2006. The University of South Carolina along with the South Carolina Academy of Science would like to acknowledge and congratulate the following outstanding students on their success



Carl Garris  
H.E. Corley  
Elementary



Calvin Orion  
Bowman  
Chapin  
Elementary  
School



Braden Reese  
Hopkins  
Middle School



Anthony James  
Logan  
Elementary  
School



Isaac Soblo  
E.L. Wright  
Middle School



Gabbie  
Rhinehart  
Hammond  
School



Forrest  
Holloman  
Lugoff  
Elementary  
School



Emily  
Wassermann  
Hammond  
School



Kirk Ryan  
Fiedler  
Hammond  
School



Kalla Elise  
DePratter  
Chapin Middle  
School



Justice  
Mitchell  
Logan  
Elementary  
School



James  
V. Masek Jr  
St. Joseph  
Catholic School



Quinton  
Bennett  
Logan  
Elementary  
School



Arjun  
Aggarwal  
Lexington  
Middle School



Michael Snyder  
Bates Middle  
School



Meredith  
Gummerson  
Batesburg-  
Leesville  
Elementary  
School



Sarah Benton  
W.J. Clark  
Middle School



Salomon Smith  
AC Moore  
Elementary  
School



Sarah Boyle  
Dent Middle  
School



Aimee Baker  
Logan  
Elementary  
School



Caroline Beebe  
Dent Middle  
School



Elizabeth V.  
Smith  
Manchester  
Elementary



Carrie  
McIntosh  
St. Joseph  
Catholic School

## **People to Watch**

### **FOUR MIDLANDS SCHOOLS STUDENTS CHOSEN AS SEMIFINALISTS**

#### **Students from the Midlands and Seven from South Carolina chosen by the Discovery Channel Young Scientist Challenge (DCYSC) as semifinalists**

The countdown to choose the nation's top young scientist began as Discovery Communications announced the 400 middle school students from around the country selected as semifinalist in the 2006 Discovery Channel Young Scientist Challenge (DCYSC). Four students from the Midlands and seven from the entire state were named semifinalists. The Four Semifinalists from The USC Region II Science and Engineering Fair are: Arjun Aggarwal – Lexington Middle School, Soorya Avali – Dent Middle School, Caroline Beebe – Dent Middle School, and Kristen McLaurin – Dent Middle School.

“Each year, the breadth of knowledge demonstrated by the DCYSC’s 400 semifinalists is inspiring and a bit humbling. These young men and women have the intelligence, energy, creativity and dedication to become the nation’s scientific trailblazers of the future,” said John Hendricks, Founder and Chairman of Discovery Communications. In addition to the four from the Midlands we have Ion Estrada Garcia A (Grade 5) from E. North Street Elementary School (Greenville), Darby Elizabeth Woodard (Grade 7), Mitchell Road Christian School (Greenville) and Haynes A. Werner (Grade 8) Beaufort Academy (Beaufort).



Arjun Aggarwal  
Lexington Middle School



Caroline Beebe  
Dent Middle School

The 400 semifinalists, and contenders for the title of “America’s Top Young Scientist,” come from 43 states, Puerto Rico, and the District of Columbia and were selected from a group of 1,900 formal entries, initially chosen from a pool of 70,000 students who entered science fairs nationwide. They were chosen for their ability to effectively communicate the reasoning and purpose behind their projects. The University of South Carolina Region II Science and Engineering Fair, The South Carolina Academy of Science and the 30 or more Sponsors supporting the fair as well as the 200 Judges for Region II are impressed by each of the above seven students in their success explaining their work to others - a prerequisite for scientific leadership.

The DCYSC is the nation’s premier science contest for students in grades 5-8. The competition gives students the opportunity to test their knowledge and push their limits as they explore the world of science. In 1999, Discovery created the DCYSC to be a part of the solution to alleviate America’s chronic underachievement in science and math. The contest responds to evidence that academic performance and interest in science among American students declines dramatically as students get older – particularly during the middle school years.

The DCYSC identifies and honors America's top middle school student who demonstrates the best skills in leadership, teamwork and scientific problem solving. In addition, the ability to be an effective science communicator – a goal that reflects Discovery's philosophy that scientific knowledge is most valuable when it is communicated and shared – is a key component of the judging.

More than 13,000 children have entered the DCYSC since its inception eight years ago. Winners have received approximately \$700,000 in scholarship awards and federal government recognition, and have participated in science-related trips that have taken them to the far corners of the globe.

The countdown to choosing America's Top Young Scientist continues next month, on September 14th, when the field of 400 semifinalists is narrowed by the DCYSC judges to the "Final Forty." The young scientists will use their scientific know-how to find solutions to this year's five-part challenge. The students will compete for more than \$100,000 worth of scholarships and special prizes, as well as the title of "America's Top Young Scientist of the Year."

Dr. Don Jordan, Director

USC Region II Central South Carolina Science & Engineering Fair

## Certified Metrication Specialist (CMS) Program

The USMA CMS Program is designed to provide documentary evidence for individuals who can qualify as metric specialists because of their education and experience in the use of the modernized metric system—known as SI (*système international d'unités*).

The CMS program is structured to help maintain professional standards in the field of metrication. With the United States' conversion to SI, companies, schools, agencies, businesses, and other facilities will seek personnel who, in addition to their job skills, are knowledgeable about SI. The USMA CMS Program is designed to give both employers and employees the documented evidence that an individual's qualifications have been carefully screened to verify that he or she has the background and ability to use the SI version of the metric system correctly.

The South Carolina version of the CMS Program encourages each school superintendent in the state to recommend one person from his/her district to be certified. Ideally we want each of 1,945 schools in the state to employ a certified metric specialist.

### Outline for South Carolina Educators - CMS

South Carolina applicants follow these procedures:

1. Obtain information (including a CMS packet) about the CMS Program
2. Fill out application form and include as references
  - a. Immediate Supervisor
  - b. School District Superintendent
  - c. USMA Eastern Director, Don Jordan
3. List courses taught, number of years of teaching experience, and at what levels (elementary, middle, high school, post-secondary)
4. Make arrangements to take CMS Exam (80% is passing score)
  - a. By appointment
  - b. At SCAS/SCJAS Annual Meeting site
  - c. At SCSC
  - d. SCCTM Annual Meeting
  - e. Other

You may schedule your exam at any one of several sites across the state. See address at bottom of page.
5. Checks should be made payable to **USMA CMS Program**. A discounted fee (\$25.00) can be paid at the time of the exam. (Note: Regular fee is \$65.00).

CMS Exam results are confidential.

Names of successful candidates will be added to all USMA lists and, for SC educators, names will be published in both the *SCJAS* Newsletter and the *SCAS* Newsletter. Names will also be forwarded to the State Department of Education, the Commission on Higher Education, and the United States Department of Commerce.

Note: The CMS/CAMS Certification Program is an educational project that has the support of the State Department of Education and the following organizations.

<b>SCSC</b>	South Carolina Science Council	<b>SCAS</b>	South Carolina Academy of Science
<b>SCJAS</b>	South Carolina Junior Academy of Science	<b>SCCTM</b>	South Carolina Council of Teachers of Mathematics
<b>USMA</b>	United States Metric Association		

For information, to obtain a CMS Exam application, or to schedule an exam, write or call:

Dr. Don Jordan, CMS Program, College of Arts and Science, Center for Sci Ed, Sumwalt 323,  
University of South Carolina, 1212 Green Street, Columbia, SC 29208

Phone: (803) 777-7007

Fax: (803) 777-4396

E-mail: [jordan@gwm.sc.edu](mailto:jordan@gwm.sc.edu)

**CERTIFIED METRIC SPECIALISTS FOR SOUTH CAROLINA**  
**Sponsored by South Carolina Academy of Science and United States Metric Association**  
**Coordinated with U.S. Department of Commerce, South Carolina Department of Education,**  
**and the South Carolina Commission on Higher Education**

Ms. Sherry Bailey (011) Spring Valley High School	Dawn Cameron (026) Aiken SC 29803	Ms. Rebecca E. Pugh (049) Mid-Carolina Middle	Ms. Sandra Wilcox (071) Eastwood Hill Episcopal
Ms. Morris Burdicker (042) Barnwell High School	Tom Fattiggo (027) Summerville SC 29480	Ms. Irene Justice (056) Columbia SC 29213	Lorretta A. Tomko (073) Barnwell, SC 29812
Ms. Barbara Gardner (043) Wade Hampton High School	Zeddie Dwyer (028) Marbleville SC 29428	Ms. Nancy Taylor (051) Cromwell Drive Elem.	Jody Fordard (074) Lauras, SC 29540
Mr. Larry Mason (044) Union High School	Martha Lee Russell (029) Manning High School	Ms. Audrey A. Anshel (052) North Springs Elementary	Catherine Lynch (075) Lata Wylie, SC 29750
Ms. Chelsea Wenz (005) Dorcas Creek High School	Linda Fuller Brown (036) Cayleston Rd. Elgin School	Judy W. Doss (053) Johnston Middle School	H. Blackwell (076) Andrew, SC 29530
Ms. Linda Skelton (006) Sci Dept. of DE. Sci. Council	Eileen R. Ellis (031) Manning Primary School	Candice H. Cruser (054) Anderson, SC 29611	Dawn Parley (077) Rock Hill, SC 29752
Ms. Kandiya Burton (007) S. Aiken High School	Patry D. Graham (032) Gwynn School	Sharon C. Coates (055) Columbia, SC 29209	John E. Bostede (078) Newberry High School
Mr. Richard Porter (008) Catawba High School	Ann M. Bayles (033) Ridgely-Laurel Middle	Margaret S. Couch (056) Greenville, SC 29607	Jesse Bailey (079) McCormick Middle School
Mr. David C. Keller (009) McCormick High School	Ben A. Walworth (034) Addicks-Helene Acad.	Clady Gardner (057) Lexington, SC 29072	Kathie D. Stapp (080) Newberry High School
Mr. Robert I. Matthews (000) Timonawalla High School	Yvonne Spencer (035) Cayleston Rd. Elgin School	Sheryl Pitts (000) Anderson, SC 29611	Harold Pierce (081) Clinton Elementary School
Mr. Stephen T. Rains (011) Cromwell High School	Dawn P. Allen (036) Holly Hill Primary School	Ludie Sanford (059) Greenville, SC 29649	Janice Murray-Gunlike (082) Williamsburg County School
Ms. Edie S. Miller (012) Merrimber Elem. School	Margaret Ann Paul-Cookson (037) S. Edinboro Elgin School	Steen H. Young (060) Newry, SC 29113	Robert Schibel (083) Columbia, SC 29212
Mr. John L. Kinard (013) Dorchester High School	Angela Holt (038) John Ford Middle School	Ms. Carole Ebbel (061) Manning SC 29362	John Daniel Wicker (084) Newberry College
Ms. James D. Angel (014) Palmetto High School	Milton Woodard (039) Kingslee SC 29354	Ms. Lillian E. Foster-Vassell (062) Columbia SC 29213	Martina Malottari (085) Wadesboro High School
Mr. Johnny Davis (015) Georgetown School District	Sharon L. Valentine (040) Ashland, KY 41101	Ms. Carole Gibson (063) Dorchester SC 29431	Dwight Colbeth (086) Greenville, SC 29646
Ms. Christine Randolph (017) Columbia County H.S.	Diana Z. Mathews (041) Christ Church Episcopal	Mr. Richard Egan (064) Hagerston High School	Sharon M. Brown (087) Hart Middle School
Ms. Arlene D. Johnson (009) Mullins High School	Ms. Kimberly J. Carter (042) McCorry-Linton Elementary	Ms. Tina Wicks (065) Elgin Head High School	Linda Jackson (088) Cayleston E. Elementary
Mr. Bruce Rigde (020) Hickville-Ridge High School	Ms. Frances F. Dentler (043) -----	Dr. Joe Murchison (066) Edenton, NC 27932	Edith Sue Wynn (089) Southside Middle School
Ms. Louisa R. Fleming (021) Liberty High School	Ms. Beth S. Glawicki (044) Rosedown Elementary	Ms. Diane Beale (067) Mason SC 29569	Elmer Smith (090) H. Anderson Middle School
Mr. Ron Harbo (022) Watauga SC 29178	Ms. Deanne A. Hatley (045) Lexington Middle School	Ms. John Pugh (068) Prosperity SC 29127	Roger Williams (091) Anderson County Alternative .....
Mr. James Freyberg (023) Chadwick SC 29407	Ms. P. L. Henderson (046) North Springs Elementary	Ms. Marie Wierwille (069) Elgin Head Elem. SC 29018	Rowdyh Ewold (092) Dixie High School
Ms. Rena Patel (024) Orangeburg Williams H.S.	Ms. Virginia Q. Lacy (047) North Springs Elementary	Mr. John Bonnesky (070) Anderson SC 29625	Michael J. Kassar Ridgely-Laurel (093)
Ms. Rosemary Wicker (025) Upper Soc. H&S Hub	Ms. Anita Jackson (048) Lexington Middle School	Mr. Mark Mendenhall (071) Aikson Middle School	Walter E. Six Airport High School (094)

( ) certificate number

**For information contact: Dr. Don Jordan, Center for Sci Ed, College of Arts & Science, Sumwalt, University of South Carolina, 1212 Green St, Columbia, SC 29208 Ph: 803/777-7007 FAX 777-4396, e-mail: jordan@gvm.sc.edu**

# MANUAL OF PROCEDURES South Carolina Academy of Science

## A Handbook for Officers and Committee Chairs

### Compiled and Edited by

Jack A. Turner - 1982   Gordon Sproul - 1991   John D Bernard – 1996  
David J. Stroup - 1998, 2001

### INTRODUCTION

This Manual is intended to serve as a guide for officers, committee chairs, and committee members of the South Carolina Academy of Science and to aid them in the performance of their duties. The Secretary of the Academy should maintain and distribute a copy of the Manual to new Council members. Except as directed in the Constitution and Bylaws, the policies and procedures described are not intended to be rigidly followed. Although current customs and present and past purposes are emphasized, new ideas and directions in operations should be encouraged. Officers and committee chairpersons should seek creatively to improve and develop the functions and programs of the Academy to meet the changing needs of South Carolina and the scientific community.

Development of this manual was first begun in the late 1960's when officers and committee chairs submitted descriptions of their duties as they saw them. These materials have been updated and edited at intervals. Jack A. Turner edited a copy of the Manual in 1982. Gordon Sproul updated and recompiled the Manual in 1991 and moved the Manual to electronic form. John D. Bernard sent out surveys to Council members in 1994-1995 and updated the Manual in 1996, also moving the electronic form to an electronic desktop published version. This manual was revised by David J. Stroup and the 70th and 71st Councils of the SCAS. This narrative includes statements of general policies and procedures approved by the Council, with organizational descriptions, and with the Constitution and Bylaws (revised 1997). The varying styles of the descriptions reflect their authorship, although the editors have attempted to create a unified presentation using modern phraseology.

This manual includes a rearranged order of topics as well as several new job and standing committee descriptions. Because it is now stored in IBM compatible software, it can be readily updated when changes are desired; this should encourage frequent updating of the materials.

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I. CONSTITUTION AND BYLAWS OF THE SOUTH CAROLINA ACADEMY OF SCIENCE  
(Revised April 6, 2001 and March 10, 2006)

**ARTICLE I. NAME AND OBJECT**

**Section 1.** The name of this organization shall be the South Carolina Academy of Science.

**Section 2.** The objective of the Academy shall be to promote the advancement and constructive use of science in South Carolina by: (a) encouraging the association of scientifically oriented people to bring their talents to bear usefully on public policy, (b) providing means to facilitate the work of scientists and to promote cooperation among them, (c) improving the teaching and appreciation of science in schools at all levels, and (d) working to improve the public understanding and appreciation of science.

**Section 3.** In the event of dissolution, the residual assets of this organization will be turned over to another organization which is itself exempt from Federal Income Tax as an organization described in Section 501(C)(3) of the Internal Revenue Code, or to the Federal, State or Local Government.

**ARTICLE II. MEMBERSHIP AND DUES**

**Section 1.** The membership shall be of nine (9) classes: regular, student, contributing, joint, life, patron, honorary, distinguished, and emeritus.

**Section 2.** Any person(s) actively interested in science or the promotion of science may be elected to membership in the Academy by a majority vote of Council. Also, by a majority vote of the Council an institution or organization may be elected as a patron of the Academy.

**Section 3.** There shall be no initiation fee. Dues shall be paid in the amount provided in the Bylaws.

**ARTICLE III. OFFICERS AND COUNCIL**

**Section 1.** The officers of the Academy shall be a President, a President-Elect, a Vice-President, a Secretary, a Treasurer, and twelve Councilors.

**Section 2.** The officers named in Section 1, together with the two Immediate Past Presidents, shall constitute the Council in which the governance of the Academy shall be vested. The Bulletin Editor, the Newsletter Editor, the Webmaster, a representative of the South Carolina Science Council, the Director of the Middle/Elementary School Academy of Science, and the Executive Director of the South Carolina Junior Academy of Science shall be ex-officio members of the Council.

**Section 3.** The Vice-President shall be elected annually and shall succeed to the office of President-Elect. Councilors shall be elected for three-year terms, staggered so that four Councilors are elected annually. The Secretary and the Treasurer shall be elected for three year terms, with re-election for additional terms encouraged.

**Section 4.** The officers shall perform the duties of their respective offices under the direction of the Council. The term of office shall commence on July 1st following the annual meeting at which the elections are held and shall continue until successors are qualified.

**Section 5.** A vacancy occurring in any office in the interim between annual business meetings shall be filled by election by the Council.

**ARTICLE IV. REPOSITORY AND CURATOR**

**Section 1.** The library of the University of South Carolina at Columbia is hereby designated as a repository for such books, bulletins, journals or other matters of permanent record or interest as may come into the possession of the Academy by gifts or otherwise.

**Section 2.** The Council shall designate annually a member of the Academy, situated at the University of South Carolina, to be the Curator of such deposited material.



#### **ARTICLE V. PUBLICATIONS**

**Section 1.** The Council shall cause to be published annually a volume of proceedings as a permanent record of the activities of the Academy. Such publication shall be the responsibility of the Bulletin Committee. The President is hereby authorized to appoint, with the approval of the Council, three members to the Bulletin Committee, one of whom shall be designated as Editor. The terms of office shall be one year. In addition, the Webmaster, and the Secretary shall be ex-officio members but shall not serve as Editor.

**Section 2.** The Council shall cause to be published quarterly a Newsletter. Such publication shall be the responsibility of the Newsletter Committee. The President is hereby authorized to appoint, with the approval of the Council, three members to the Newsletter Committee, one of whom shall be designated as Editor. The terms of office shall be one year. In addition, the Webmaster, and the Secretary shall be ex-officio members but shall not serve as Editor.

#### **ARTICLE VI. MEETINGS**

**Section 1.** There shall be an annual meeting for the presentation and discussion of papers and for the transaction of business. The annual meeting shall be held at a time and place determined by the Council.

**Section 2.** The program for the scientific sessions at the annual meeting shall be prepared by a Program Committee appointed and chaired by the President-Elect.

**Section 3.** At the annual meeting a specified hour shall be set aside for the annual business meeting.

#### **ARTICLE VII. JUNIOR ACADEMY**

**Section 1.** The South Carolina Junior Academy of Science (Junior Academy) shall be a subsidiary organization of the Academy. The Academy shall assist the Junior Academy in providing activities which encourage an interest in science among secondary students in South Carolina.

**Section 2.** The Executive Director of the Junior Academy shall be an ex-officio member of the Council of the Academy. The Executive Director shall be nominated by the Board of Directors of the Junior Academy and shall be appointed by the Council of the Academy.

**Section 3.** The affairs of the Junior Academy shall be governed by a Board of Directors, which includes teachers and students and other interested persons, as specified by the Bylaws of the Junior Academy. These Bylaws shall be devised by the Board of Directors of the Junior Academy, and shall be ratified by the Council of the Academy.

#### **ARTICLE VIII. MIDDLE SCHOOL ACADEMY**

**Section 1.** The South Carolina Middle School Academy of Science (Middle School Academy) shall be a subsidiary organization of the Academy. The Academy shall assist the Middle School Academy in providing activities which encourage an interest in science among pre-secondary students.

**Section 2.** The Executive Director of the Middle School Academy shall be an ex-officio member of the Council of the Academy. The Executive Director shall be appointed by the Council of the Academy.

**Section 3.** The affairs of the Middle School Academy shall be governed by a Board of Directors which includes teachers and students and other interested persons, as specified by the Bylaws of the Middle School Academy. These Bylaws shall be devised by the Board of Directors of the Middle School Academy, and shall be ratified by the Council of the Academy.

#### **ARTICLE IX. WESTERN UPSTATE REGIONAL SCIENCE FAIR**

**Section 1.** The South Carolina Academy of Science Upstate Science Fair (SCASWURF), also known as the AOP Regional Science Fair of SC Region IB Science Fair shall be a subsidiary organization of the Academy. The Academy shall assist the AOP Regional Science Fair by providing financial oversight to aid it to provide a regional science fair to encourage an interest in science and engineering among students that region of South Carolina.

**Section 2.** The Officers will consist of at least three persons: The Science Fair director, an Executive director, and a member of SCAS appointed by the SCAS president with the approval of Council. The sole purpose of SCASWURF is to raise funds to operate a regional science fair in the Western Upstate Region and to send delegates to the International Science and Engineering Fair (ISEF).

**Section 3.** The affairs of the AOP Regional Science Fair shall be governed by a Board of Directors, which includes the officers listed in Section 2 and other interested persons, as specified by the Bylaws of SCASWURF. These Bylaws shall be revised by the Board of Directors of SCASWURF, and shall be ratified by the Council of the Academy.

#### **ARTICLE X. AMENDMENTS**

**Section 1.** This constitution may be amended only by two-thirds vote of those present at an annual meeting, provided that such proposed amendment be submitted in writing to the Council, and by it promulgated to the membership with its recommendation, at least two weeks before the annual meeting.

#### **BYLAWS**

1. Applications for membership (other than honorary, distinguished, and emeritus) may be made at any time to any member of Council provided that each application be accompanied by payment of dues for one year.

2. Membership dues shall be as follows: (a) Regular membership dues shall be twenty-five dollars per year, except for teachers of grades 12 or lower who shall pay one-half times the regular rates; (b) Student membership dues shall be one-half times the regular membership dues; (c) Joint (spouse) membership dues shall be one and one-half times the regular membership dues; (d) Life membership dues shall be fifteen (15) times the dues for a regular member, payable over not more than three years, after which no further dues will be asked; (e) Patron membership dues shall be determined by Council; and (f) Emeritus, Distinguished, and Honorary memberships shall have no dues.
3. Membership dues are due and payable on the first day of January each year. Those dues determined from the regular member dues rate will always be rounded down (when necessary) to the nearest integer dollar amount. Members in arrears shall neither participate in the deliberations of the Academy nor shall receive the Bulletin, and shall be dropped from the roll when they are two years in arrears (student members shall be dropped after one year), provided they have been notified annually of their delinquency.
4. Emeritis membership shall be available for those retired members who either have held membership in SCAS for at least ten years and who request such states from the Secretary or have been recommended for such status by Council.
5. A membership card shall be provided to each member. Each member shall also receive the Newsletter and the Bulletin, except in the case of joint members who will together receive one copy of each publication.
6. The program for the scientific sessions of the annual meeting shall be published in the Newsletter before the meeting. No paper shall be placed on the program unless it shall have been approved by the Program Committee and unless it shall have been accompanied by an abstract in proper form for publication. The presenter or the senior author, whichever may be preferred by the authors, must be a member in good standing. The Secretary shall issue a call for papers in ample time to make the preparation and publication of the program possible.
7. Nothing in these Bylaws shall be interpreted as preventing the participation of non-members in the scientific session, upon the invitation of the Program Committee.
8. At the annual business meeting, the following order of business shall prevail: (1) Minutes of the previous meeting; (2) Minutes of the Council; (3) Reports of officers (President, Secretary, Treasurer, Curator, Editor); (4) Reports of Committees; (5) Unfinished Business; (6) New Business; and (7) Election of officers.
9. In the interim between annual business meetings, Council shall meet at least quarterly, at the call of the President. Two weeks notice shall be given and those present shall constitute a quorum for the transaction of business, provided that at least three members of the Council be present.
10. These Bylaws may be amended at any annual meeting by two-thirds vote of all members present. Such amendments may be submitted to the Council, or proposed from the floor as new business.

## END OF CONSTITUTION AND BYLAWS

### II. MEMBERSHIP

- A. A list of members in the Bulletin shall be in nine groups: regular, joint, student, contributing, life, emeritus and honorary, patron, distinguished.
  1. The major fields of interest of the members shall be shown by an appropriate symbol placed at the end of the line in the list in the Bulletin.
  2. Designated representatives of patron members shall be listed with the patrons they represent. They shall receive for their patrons all mailings from the Academy and shall as representatives of their patrons have all rights and privileges of membership.
- B. Emeritus Membership.
  1. Emeritus membership may be conferred on members who meet these requirements:
    - a. are members in good standing for at least ten (10) years.
    - b. have retired from their regular jobs through age, illness or other reasons.
    - c. have belonged to the Academy for a considerable number of years.
    - d. have significantly and unselfishly contributed to the work of the Academy.
  2. Emeritus members shall be elected by the Council.
  3. Emeritus members shall have all privileges and prerogatives of regular members but shall not be asked to pay dues.
- C. Distinguished Membership.
  1. Distinguished membership may be conferred on members who meet these requirements:
    - a. are members in good standing.
    - b. have a long term tenure of service to the Academy.
    - c. have belonged to the Academy for a considerable number of years.
    - d. have significantly and unselfishly contributed to the work of the Academy.

2. Distinguished members shall be elected by the Council.
  3. Distinguished members shall have all privileges and prerogatives of regular members but shall not be asked to pay dues.
- D. Honorary Membership:
1. Honorary members shall be elected by the Council.
  2. Honorary members shall have all privileges and prerogatives of regular members but shall not be asked to pay dues.
- E. Contributing, life, regular, joint and patron members shall be dropped from the rolls at the beginning of their third year of dues delinquency. Student members shall be dropped in their second year of dues delinquency.
- F. Only members in good standing shall receive the Bulletin. If a member pays dues for the current year at a late date, that member shall receive a copy of the latest Bulletin only.

### III. COUNCIL

The Council is the governing body of the Academy and upon it rests the responsibility of establishing and changing policies and planning programs and activities for the Academy. The Council's voting membership consists of the following persons:

Elected (and therefore "Officers" of SCAS):  
 President, President-Elect, Vice-President (1-year terms)  
 Secretary and Treasurer (3-year terms)  
 Twelve Councilors (3-year terms, staggered)

Designated:  
 Immediate Past President (1-year term)  
 Past President (1-year term)  
 Bulletin Editor (1-year term)  
 Executive Director of the S. C. Junior Academy  
 Newsletter Editor (1-year term)  
 Executive Director of MESAS

The Immediate Past President serves for one year following a term of office as President, and then for a year as Past President before leaving Council. The custom has also been for editors and the NAAS representative to serve for a period of years.

Others who are encouraged to attend Council meetings include:  
 Curator (1-year term)  
 NAAS Representative (3-year term)  
 Representative from the S. C. Department of Education  
 Representative from the S. C. Science Council  
 Representative of the S.C. Association of Chemistry Teachers  
 Representative of the S.C. Association of Biology Teachers  
 Representative of the S.C. Council of Teachers of Mathematics

Quarterly Council Meetings are scheduled and are usually held in Columbia because of its central location. These meetings occur in late July, October, January, and immediately prior to the Annual Meeting.

Chairs of the various Standing Committees are appointed by the President and serve one-year terms. They are generally selected from among the Council members and are often re-appointed to provide needed continuity.

### IV. GENERAL POLICIES AND PROCEDURES

(See also appropriate material under Job Descriptions of the various positions and under Standing Committees.) The Academy seeks to implement its objectives (see Article I, Section 2 of the Constitution) in the following manner:

- a. by conducting an Annual Meeting for the presentation and discussion of timely topics and papers involving current research throughout the scientific community in the state.
- b. by publication of a quarterly Newsletter that describes the actions of Council, promotes the organization, and describes items of interest to the general membership.
- c. by publication and distribution of abstracts of the papers presented at the Annual Meeting in its Bulletin.
- d. by sponsoring the Middle and Elementary Academy of Science.
- e. by sponsoring the Junior Academy of Science in the schools of the state which meets annually in conjunction with the parent organization and which affords such students an opportunity to present papers and hear papers in a scientific atmosphere.
- f. by having an appointed member to represent the Academy in the American Association for the Advancement of Science.

1. The President-Elect shall serve as chairperson of the Program Committee and should have complete charge of the program, including selection of papers, invitation of speakers, physical arrangements, etc.
2. Although the Constitution does not specify the date of the Annual Meeting, it should be held near the beginning of April; late April dates conflict with other meetings and end-of-school activities, while dates in March force a too-early deadline for Abstracts.
3. The place of Annual Meetings should rotate among central and more peripheral locations, generally at the President-Elect's home institution.
4. The Newsletter editor shall have the programs printed and mailed to members in the February Newsletter. The program chairperson should cooperate in this effort, assembling the program and proofreading it.
5. The Newsletter editor should issue a Call for Papers for the program in the fall Newsletter (September). An Abstract Form provided by the program chairman should be included in the Call for Papers.
6. With the exception of invited papers, the presenter or senior author of any paper presented at the Annual Meeting, whichever may be preferred by the authors, shall be a member in good standing, and all residents of South Carolina who appear on the program should be members of the Academy. In practice, papers are accepted for the program when appropriate applications for membership, accompanied by the payment of dues, are received.
7. Authors of invited papers need not be members.
8. Appropriate Academy awards shall be made or announced at the Awards Program in conjunction with the Annual Meeting. When finances permit, an awards banquet may be scheduled at the Annual Meeting.
9. All reports of committees at the Annual Meeting or elsewhere shall be submitted in writing. Annual reports of all standing committees shall be printed in the Bulletin either as parts of the minutes or otherwise. Reports of ad hoc committees shall be printed where appropriate.
10. With the approval of Council, travel expenses and honoraria may be made available to the Program Committee for invited speakers. It is preferable, however, that the Annual Meeting be self-sustaining.
11. The Academy shall make available a sum of money to the NAAS Representatives to help defray travel expenses incurred in attending the Annual Meeting of the NAAS.
12. The President shall serve as Chairperson of the Long Range Planning Committee. This Committee typically meets immediately prior to each quarterly Council Meeting. It is concerned with the growth and direction of the Academy.

## V. JOB DESCRIPTIONS: COUNCIL OFFICERS

### PRESIDENT

1. The President is the chief administrative officer of the Academy, as well as its ceremonial head, and should be concerned with all of its affairs during the year. The President should work especially closely with the Secretary, Treasurer, Editors, and the President-Elect. The President also should work with or be informed of all programs of the Academy and as Chair of the Long Range Planning Committee, assist in the development of new programs for the Academy and any changes in its operation.
2. The President is one of the constitutionally designated officers of the Academy, and with the other elected officers begins a one-year term of office on July 1, following the Annual Meeting. Transferal of materials and laying of plans for the coming year should be completed by that time.
3. The President should appoint as soon as possible, with the approval of the Council, the Editor and two other members to both the Bulletin and the Newsletter Committees, for one-year terms of office.
4. A Representative to the National Association of Academies of Science is appointed triennially by the President, with the approval of the Council, from the members of the Academy who are concurrently Fellows of NAAS. Thus, this appointment is normally to be made every third year and will not be the responsibility of every President.
5. The President must appoint a Chairperson and members of each standing committee of the Academy, described elsewhere in this manual, as well as representatives from SCAS to certain organizations. These are appointed annually except for the chairperson of the Patron Membership Committee, the NAAS Representative, and the Representative to South Carolina Research Authority Advisory Board who are appointed for three-year periods, respectively, and the members of the Long Range Planning Committee who are the officers of the Council. These appointments, as well as those of Newsletter and of Bulletin Editor, NAAS Representative, and Patron Membership Chairperson when needed, should be made early—preferably before the summer begins. All committee and chairpersons appointments should be cleared with the appointees insofar as is practical. The President may wish to ask the chairperson to suggest some or all the persons to serve with them.
6. The President may appoint officers to oversee certain groups of committees in order to provide better communication. It is recommended that the Vice President oversee the Membership, Patron Membership, and Publicity Committees in order to become familiar with their workings to more effectively serve as Program Chairman for the Annual Meeting.
7. The President must appoint those ad hoc committees initiated during the current term of office, make appointments to any other non-standing committees for which they may be needed, and act under the instructions of the Council with regard to any other appointment matters.

8. The President must see that the Council annually designates a Curator (see duties of the Curator).
9. If necessary, the President must instruct the committee chairpersons in the functions of their committees, and indicate procedures, deadlines, etc.
10. The President must call quarterly Council Meetings to work on programs and plans for the year.
11. The President must preside at meetings of the Council, at the various general meetings during the Annual Meeting, and at the Annual Business Meeting of the Academy.
12. The President should prepare an Agenda for each Council Meeting, which should be distributed, with supporting information, to Council members and other interested parties at least one week in advance of the meeting.
13. Although it is the duty of the Council to set the time and place of the Annual Meeting, the President should see that this is done as early as possible. Preferably, the place for the Annual Meeting should be decided a year ahead of time and announced at the preceding Annual Meeting.
14. Where Council approval is required for action, the President may poll its members by mail or electronic means, if that seems more practical than calling a special meeting or waiting until the next regular meeting.
15. The President should see that all officers and chairmen of standing committees have a copy of this Manual of Procedures (which they should return to the Secretary when they leave office). The President should arrange to have the Manual revised as necessary. See also the Secretary's responsibility in this regard.
16. The President must make an annual report to the Academy to be published in the Bulletin.
17. The President is to perform all other functions appropriate to the office.

#### PRESIDENT-ELECT

The President-Elect serves for one year preceding service as President.

The President-Elect attends Council meetings as an officer of the Academy. Responsibilities of the President-Elect include service as Chair of the Program Committee, appointment of chairs for the various sections of the Annual Meeting, receipt of abstracts of papers for the program, providing for the listing of the abstracts in the Newsletter and the Bulletin, setting the time of the Annual Meeting with approval of the Council, making arrangements for invited speakers and all physical facilities and providing overall coordination of the Annual Meeting program. See Program Committee in the Standing Committees section.

#### SECRETARY

The Secretary is elected to a three-year term and may be reelected. The Secretary has these responsibilities:

1. To serve as a member of the Council of the South Carolina Academy of Science and to attend all Council meetings.
2. To keep the minutes of each Council meeting and of the Annual Business Meeting of the Academy and to send to each Council member a copy of the minutes of the most recent meeting with the announcement of the next Council meeting.
3. To receive from the President annual reports of the committees and officers of the Academy and maintain them in an appropriate file.
4. To insure that every Council member has a current copy of the Manual of Procedures.
5. To maintain and preserve the official Academy files and to retain as yearly units the files for a period of six years preceding the then current year. After the files of the Academy have been in the hands of the Secretary for six years they are then given to the Curator for permanent filing.
6. To serve as an ex-officio member of the Bulletin and Newsletter Committees.
7. To apprise the President and any other officers of the Academy of any materials received which pertain to the duties of these officers.
8. To see that an adequate supply of letterhead Academy stationery is available each year.
9. To work with the Newsletter Editor to ensure that the membership is apprised of Council action.
10. To oversee the proper functioning of the several standing committees relating to publications: Bulletin, Newsletter and Resolutions.
11. To send letters of appreciation that have been approved from the Resolution Committee at the Annual Business Meeting.

#### TREASURER

The Treasurer is elected to a three-year term and may serve more than one term. The Treasurer has the responsibility:

1. To serve as a member of the Council of the South Carolina Academy of Sciences and to attend all Council meetings.

2. To receive and disburse all monies of the Academy and to keep appropriate records thereof.
3. To prepare the official list of current members of the Academy for the Bulletin.
4. To provide up-to-date sets of mailing labels for the Newsletter and other mailings.
5. To provide the Secretary and committee chairs with a list of current members upon request.
6. To provide special notification of renewal of membership to Patron Members.
7. To contact AAAS annually to determine the total Senior Academy monies available for the AAAS research awards and to notify the Executive Director of the SCJAS and the committee responsible for these awards.
8. To keep in correspondence with the Awards Committee to assist them with the monies needed.
9. To submit a written financial report to the President at the time of the Annual Meeting.
10. To set up a registration table for the Annual Meeting, with the help of the local Arrangements Committee, and to keep a record of attendance.
11. In consultation with the President, have the books audited each year. A written report should be submitted to Council.
12. To invoice the respective Sigma Xi chapters during the summer to procure funds for the various research awards.
13. To prepare a proposed annual budget for presentation at the summer meeting.

#### VICE-PRESIDENT

This officer shall serve as a member of the Council of the Academy and shall assume the duties and responsibilities of the President in his absence from meetings of the Academy or if the President is not able to fulfill the duties and responsibilities of the office.

Acting on behalf of and responsible to the President and Council of the Academy, the Vice-President shall be primarily concerned with the growth and development of the Academy. In particular the Vice-President shall be an ex-officio member of the Publicity and Membership Committees.

The term of office of the Vice-President is one year. Upon completion of the term in office the Vice-President shall succeed to the office of President-Elect.

The Vice-President should oversee the proper functioning of the several standing committees relating to science affairs: Membership, Necrology, Nominations, Patron Membership, Publicity, and Science Week.

#### VI. JOB DESCRIPTION: COUNCILORS

The Council consists of the President, the Vice-President, the President-Elect, the Secretary, the Treasurer, and twelve Councilors (four of whom are elected each year for a three-year term). The Immediate Past President and Past President also serve on the Council. The Bulletin Editor, Newsletter Editor, Executive Director of SC MESAS and Executive Director of the South Carolina Junior Academy of Science serve as ex-officio members of the Council. All members have similar responsibilities, which are:

1. To give careful consideration to all matters brought before the Council;
2. To bring ideas concerning the Academy before the Council; and
3. To cooperate and assist in the implementation of Council decisions.

#### BULLETIN EDITOR

The Bulletin Editor is designated annually by the Council. The Editor has the responsibility of preparing, publishing and delivering the Bulletin. He/she must collect materials from Council members, edit these, have them typed, printed, bound and mailed. See Bulletin Committee for contents of the Bulletin.

#### EXECUTIVE DIRECTOR OF THE SCJAS

The Executive Director of SCJAS

1. Serves as Chairman of the High School Relations Committee. The Director prepares the agenda for this committee and serves as an ex-officio member of the Council of SCAS, representing the Junior Academy.
2. Appoints two Adult Directors of the Junior Academy each year — with the approval of the SCAS President and the High School Relations Committee — and keeps in contact with all Adult Directors to ensure that they carry out their duties. The Executive Director may appoint additional Student Directors each year to assist with duties.
3. Is responsible for the finances (such as from SCAS, outside grants, and private gifts) of the Junior Academy.
4. Maintains the database for SCJAS clubs and does necessary correspondence for the day-to-day operation of the Annual Meeting of SCJAS.
5. Directs all programs for the Junior Academy or appoints an appropriate person to act in his place.

6. Appoints an Editor of the SCJAS Newsletter and should maintain a professional quality of that publication. The Editor edits, prints, and distributes Newsletters to all individual members, officers, SCAS Council members, and those in leadership roles in the Junior Academy. These Newsletters will be mailed in August/September, November/December, February/March, and April/May. The August/September edition shall include application information and Fall Workshop details. The November/December edition shall include Winter Workshop details, results from the Fall Workshop, AAAS research grant information, a Call for Papers for the Spring Annual Meeting, etc. The February/March edition shall include specific details of the spring Annual Meeting and registration instructions for the meeting. The April/May edition shall include awards and results of the annual meeting. The Executive Director will review and approve each Newsletter edition.
7. Appoints an Adult Treasurer to work alongside the elected SCJAS student Treasurer. The Treasurer will be responsible for collecting all dues, paying all bills, preparing the annual financial report, keeping an updated database of the membership and providing the officers of SCJAS with mailing labels.
8. Serves as a Trustee of the SCAS/SCJAS Trust Fund along with the Immediate Past SCJAS Executive Director, the President of SCAS, the Immediate Past President of SCAS, the Treasurer of SCAS, one SCJAS Sponsor, and the Senior Trust Officer of First Citizens Bank. John Michener — the Founder of SCJAS — will serve as ex-officio Trustee.
9. Presides jointly with the Student President at all meetings of the Board of Directors. There are normally three called meetings of the Board each year.
10. Works closely with the Secretary of SCAS in planning the Junior Academy activities, especially the Annual Meeting.

#### IMMEDIATE PAST PRESIDENT

The Immediate Past President should alternate with the Past President in overseeing the proper functioning of either the standing committees on secondary school relations or the standing committees on awards. The standing committees concerned with awards include the following committees: Governor's Awards, High School Research, Outstanding Secondary Science Teacher, Research Paper, Explorers, and other awards.

#### NEWSLETTER EDITOR

The Editor has the responsibility of supervising the layouts, typesetting, printing, publication and mailing of the Newsletter. The Editor must solicit articles from Council members, write feature articles and editorials, edit news items and submitted articles and prepare announcements for each issue. The Editor may be assisted in these tasks by an assistant or associate editor.

The Newsletter Editor should annually set deadlines for submission of articles for inclusion in the four annual editions of the Newsletter. Normally these four editions will be published in August/September, November/December, March and June/July. The August/September issue is sent not only to members but also is widely disseminated within the state. It should include an initial Call for Papers. The November/December issue should include the formal Call for Papers. The March edition should include details of the Annual Meeting, nominations of offices, and any proposed Constitutional or Bylaws changes. The June/July edition should recognize the award winners for the several awards made by the Academy.

#### PAST PRESIDENT

The Past President should alternate with the Immediate Past President in overseeing the proper functioning of either the standing committees on awards or the standing committees on secondary school relations. Standing committees relating to secondary school relations involves the following committees: AAAS Research Grant, High School Relations, Science Fairs, and NAAS Representative.

#### EXECUTIVE DIRECTOR OF S.C. MESAS

- 1.
- 2.
- 3.

## VII. JOB DESCRIPTION: APPOINTEES

### CURATOR

The Curator is designated annually by the Council and must be a member of the Academy and situated at the University of South Carolina at Columbia. This person has custody over the repository of Academy materials located there (see Article IV of the Constitution).

It has been the duty of the Curator to report annually the issuance of copies of the Bulletin to other Academies of Science and institutions in the United States and foreign countries and the receipt of exchange copies of publications and these sources.

It is the duty of the Curator to oversee the permanent disposition of Academy materials and the placing of those items deemed worthy in the USC Library.

The Curator and the SCAS President must contact all committee chairmen one month prior to each Annual Meeting and request that copies of all correspondence and documents with historic value be received on or before the date of the Annual Meeting.

Although the appointment has been annual it has been the custom for the Curator to serve a number of years.

### NAAS REPRESENTATIVE

(Representative to the National Association of Academies of Science from the South Carolina Academy of Science)

The NAAS Representative is appointed by Council. The principal duty is to represent the Academy at meetings of the NAAS. Reports of Council Meetings of NAAS are then made to the Council of the Academy. In addition, the representative receives a rather large mailing from NAAS throughout the year, and this material should be digested for items of import to the South Carolina Academy of Science.

The primary purpose of the NAAS is to provide an organization for the promotion of the common aims of the various academies and the American Association for the Advancement of Science (AAAS).

The second purpose of the NAAS is to aid all member academies in their common purposes and accomplishments. Toward this end an annual meeting is held, in conjunction with the AAAS Convention, at which time delegates from the member academies participate in a day-long program of activities involving subjects of concern to academies of science. In addition, the Board of Directors of the NAAS and the committee members work throughout the year on matters that are supportive of member academies — planning the program for the Annual Meeting, including the program of the American Junior Academy of Science, distributing mailings to the officers of the member academies, including Newsletters, and meeting with AAAS Representatives to discuss and to plan cooperative endeavors such as youth activities in science.

### REPRESENTATIVE TO THE SC RESEARCH AUTHORITY ADVISORY BOARD

A member or former member of Council is appointed at the recommendation of the President and approval of Council to serve a three-year term as the SCAS representative to the Advisory Board of the SC Research Authority. This board meets quarterly to evaluate demographic and business trends and to make recommendations to advance South Carolina as a desirable site for establishing new business ventures.

## VIII. STANDING COMMITTEES

### BULLETIN ADVISORY COMMITTEE

The committee's responsibility is to issue the Bulletin of the South Carolina Academy of Science annually, preferably one month before the Annual Meeting which it covers. The Bulletin Editor has the following responsibilities:

1. To include in the Bulletin the following items relating to the previous Academy year just ended:
  - b. a list of committee chairs and members;
  - c. committee reports;
  - d. minutes of Council meetings;
  - e. minutes of the previous Annual Business Meeting;
  - f. a list of major awards made with a brief biographical/ professional essay about each awardee;
  - g. a membership list, with patron members prominently identified.



2. To include in the Bulletin the following items relating to the upcoming Academy Annual Meeting:
  - a. a description of the symposium or special lecture;
  - b. the schedule of SCAS technical sessions and the abstracts of all papers to be presented;
  - c. the schedule of SCJAS technical sessions and the abstracts of all papers to be presented;
  - d. other information pertaining to the SCAS/SCJAS annual meeting as appropriate.

#### GOVERNOR'S AWARDS FOR EXCELLENCE IN SCIENCE COMMITTEE

The Governor's Awards for Excellence in Science, formally the Drug Science Foundation Contribution Award to Science in South Carolina, is under the joint sponsorship of the Governor's Office, and the South Carolina Academy of Science. Each of two awards, consists of an honorarium of \$1,000 and a citation and is presented at the Annual Meeting of SCAS. One award is given for science discovery and the other award is for science awareness.

The process of selecting the recipient of the award each year is conducted by an Award Administrative Committee and an Award Selection Committee, chaired by members of the Academy. The Administrative Committee is responsible for the preparation and distribution of the nomination form, receipt of the nominations with supporting documentation, duplication of these documents, and distribution of a completed packet to members of the Selection Committee. In addition, the Administration Committee prepares the citation for presentation to the recipient at the Annual Meeting. The Selection Committee consists of a chair from the Academy, a representative from the Governor's Office, a representative from the South Carolina Commission of Higher Education, representatives from USC, MUSC, and Clemson University, a representative from the smaller colleges in the state, and two other members selected from industry and/or the Savannah River Plant. The members serve two-year terms and the terms are staggered such that half are selected each year. The Chairman of the Selection Committee is responsible for recruitment of the members of the selection Committee, with assistance from the Council of the Academy.

Normally the announcements for the Award are mailed in November of each year with a deadline of January 15 for receipt of completed nomination forms. The Selection Committee meets in February to select the recipient of the Award.

#### HIGH SCHOOL RESEARCH AWARDS COMMITTEE

The South Carolina Junior Academy of Science (through funding from the American Association for the Advancement of Science and the South Carolina Academy of Science) and the Clemson University Chapter of Sigma Xi jointly sponsor junior research grants for high school students. These research grants are made in order to further encourage the investigation in pure and applied mathematics and science. Each grant is to be used for a research project to be carried out by a suitably qualified student enrolled in a high school in South Carolina. The award is to be used by the student primarily for expenses such as chemicals, minor equipment items, or other supplies; this includes expenses incurred in good faith for successful completion of the project. Travel expenses are not included.

The High School Research Awards Committee:

1. Sends an announcement to all high schools in South Carolina soliciting applications in the fall and in the spring.
2. Collects and provides for the evaluation of these applications.
3. Makes awards to fund those proposals deemed worthy.
4. Prepares award and congratulatory letters for the President's signature.

#### LONG RANGE PLANNING COMMITTEE

The purpose of the Long Range Planning Committee is to plan the growth and development of the Academy. It should propose new programs and activities and evaluate current activities. It should review suggestions from the Council or the membership and make recommendations based upon these. Its chairman shall be the President of the Academy. This committee is made up of the Council Officers, and has responsibility:

1. To recommend new programs.
2. To review and evaluate suggestions from all sources. The Committee should actively solicit suggestions from all Academy members.
3. To make recommendations to the Council designed to improve the organization, activities, and services of the Academy.
4. To meet at least quarterly and as required by its business.
5. To review the Manual of Procedures and make recommendations for its updating, including the Constitution and Bylaws of the Academy.

6. The President, as chairman of this committee, shall submit an annual report of the deliberations of this Committee for publication in the Bulletin. This report should include all ideas considered whether approved or not.

7. To receive all requests for financial support for programs and events not normally sponsored by the Academy. Each request must be transmitted to the Council with a recommendation for approval, modification, or rejection.

#### MEMBERSHIP COMMITTEE

The Membership Committee is appointed annually by the President. The Chairperson, however, may submit to the President the names of those persons preferred to serve on the committee. The Committee may be as large as is manageable, with representation from as many different institutions over the state as is practical. The Chairperson and/or other Committee members may be asked to serve more than one year so as to provide greater continuity of membership activities.

The Committee's purpose is to solicit, maintain and increase membership in the Academy by contacting prospective members, promoting the programs and aims of the Academy and encouraging attendance at and participation in the Annual Meeting. Insofar as is practical, promotional materials should be distributed everywhere in the state where new members might be found and personal contacts should be made with Academy representatives at all institutions or places of employment where members might be recruited.

The Committee should consider various ways by which membership might be increased and also the interest of members sustained and Academy membership made more meaningful, and should make appropriate recommendations to the Council or the Long Range Planning Committee.

The Committee has the responsibility of recommending persons for Emeritus membership, distinguished membership and honorary membership.

#### NECROLOGY COMMITTEE

The Necrology Committee's task is to make inquiry about any members who have died since the preceding Annual Meeting of the Academy and to make a biographical report concerning deceased members at the succeeding Annual Meeting. After the chairman has made his report, it is customary for the members of the Academy to rise for a moment of silence in honor of these persons.

A sample letter of inquiry which is sent to the various institutions in the state is given as follows (the date will vary based on the time of the Annual Meeting):

*(return address)*  
*February 12, 1995*  
*(addressee)*

Dear \_\_\_\_\_:

*The Necrology Committee of the South Carolina Academy of Science is preparing a report concerning any deceased members who have passed away since the meeting of last spring. For this reason we are writing you requesting that you send us any information concerning the death of any member associated with your organization or institution which has occurred during the past year.*

*For this report we wish the full name of the deceased and his last position. In addition we would like to have a biographical sketch, a list of his previous positions, and his accomplishments.*

*In order to get this report ready for the April meeting, we shall appreciate it very much if this information is sent early enough so that we can receive it by March 23.*

*Yours sincerely,*

*The Necrology Committee of The South Carolina Academy of Science*

The report of the Necrology Committee is printed in the Bulletin in the form of biographical sketches of the deceased members of the Academy.

#### NEWSLETTER COMMITTEE

The Newsletter Advisory Committee assists the Editor by establishing the journalistic policy of the Newsletter and by suggesting possible editorial subjects. Individual committee members may, from time to time, contribute

feature articles, news items or editorials. The Council has approved the selling of advertising space to appropriate organizations or companies.

#### NOMINATIONS AND ELECTIONS COMMITTEE

The Nominations and Elections Committee consists of the Past President as Chairperson, and the two most recent Past Presidents. Duties of the Committee are to present a slate of nominees to the Academy membership for the offices of Vice-President, and three Councilors. On years when their terms expire, a slate of nominees for Secretary and Treasurer will be formulated. Names and biographical sketches of all nominees will be published in the Newsletter immediately preceding the Annual Business Meeting.

Elections are held during the Annual Business Meeting. The President announces the names of the nominees and asks them to stand to be recognized. A ballot will be distributed to all members in attendance. The President will appoint a Ballot Committee, of at least three members, who will tally the votes. A simple majority is required for election. In the event a nominee for Councilor does not receive a simple majority, a run-off election will be conducted between the two nominees with the largest number of votes. Results are announced before the business meeting is adjourned.

#### PATRON MEMBERSHIP COMMITTEE

The role of the Patron Membership Committee is to maintain contact with the Academy's patron members and to encourage their participation in and support of Academy activities. It also encourages each member of the Council to promote patron membership among institutions and industries in their regions of South Carolina.

The Chairman of the Committee on Patron Members shall:

1. Be elected by Council for a three-year term which is renewable;
2. Obtain from the Treasurer the annual dues invoices for patron members and to forward these invoices with a letter outlining recent Academy activities to each patron member. Patrons should send their dues directly to the Treasurer.
3. Conduct all correspondence with patrons and prospective patrons;
4. Report at suitable intervals to the Treasurer and to Council.

The Responsibilities of the members of the Committee are:

1. To assist the Program Chair in contacting nearby industrial patron members for service on the Steering Committee for the Annual Meeting.
2. To seek additional institutional and industrial patron members.
3. To contact those patron members who do not respond to the dues notices and to encourage their membership renewals.

#### PROGRAM COMMITTEE

It is the responsibility of the Program Committee, chaired by the President-Elect, to prepare a program and make all physical arrangements for the Annual Meeting. The Program Committee Chair should appoint individuals to head local arrangements and sections. The date(s) and location of the meeting should be submitted to the President for approval no later than the July Council meeting preceding the Annual Meeting. After soliciting suggestions for the program, the Program Committee Chair should discuss general plans, including special speakers, symposia, banquets, etc., at the July and September Council meetings. Budget for the meeting should be prepared by late summer. Plans should be complete in time for inclusion in the Call for Papers and accompanying letter and other materials which go out to the membership in September or October Newsletter.

The Executive Director of the Junior Academy of Science should be kept informed of meeting plans and coordinate with the Program Committee Chair on Junior Academy meeting plans. Individuals in charge of sections should solicit members and institutions in their fields for submission of papers for the Annual Meeting. The local Arrangements Committee should schedule and equip all rooms for the meeting. It should also arrange with the Treasurer for the maintenance of the registration desk and attendance record of the meeting.

Other professional groups wishing to meet jointly with SCAS should be notified by the Program Committee Chair. These organizations should be granted a place on the program.

#### PUBLICITY COMMITTEE

The Publicity Committee is charged with the responsibility of collecting, assembling and disseminating newsworthy information, human interest stories, pictures, facts and general news which would promote the South Carolina Academy of Science in any and all forms of media.

The Committee is responsible for updating and printing brochures periodically.

The committee should develop channels of communication with newspapers, magazines, radio and television stations.

Among the goals and objectives of the committee should be: to bring the Academy favorably to the attention of the public as the principal support group for Science in South Carolina, to enhance the recognition of the Academy, and to explain and clarify the role of the Academy in promoting science both as an intellectual pursuit and a benefit to the welfare of mankind. All Academy-sponsored events, programs, awards and activities should be publicized and scientific activity within the state should be sought out and promoted in the media.

#### RESOLUTIONS COMMITTEE

This Committee formulates resolutions expressing the appreciation of the Academy to its hosts for the Annual Meeting and to any other special person(s) or group(s) to whom expressions of appreciation should be made. The Chairperson of the Committee is appointed by the President. A member of the Committee presents the resolution(s) at the annual business meeting of the Academy, provides the Secretary with a copy, and suggests that a motion for the adoption of the resolution(s) be made.

#### SCIENCE FAIRS COMMITTEE

The President annually appoints the Chairman; it has been customary for the Chairperson to serve for a number of years.

The Science Fairs Committee has the responsibility of:

1. Promoting Science Fairs in South Carolina, both on a local and regional level, although most of its effort has been directed at the regional level.
2. Working with directors from each region who are certified by the International Science and Engineering Fair organization in Washington, D.C. (Division of Science Services).
3. Preparing a Directory of Regional Fairs to include the following information: Director, Location, Date of Fair, and Fair Sponsors. This Directory is printed in the SCAS Newsletter.
4. Aiding each regional director, where possible, but accepting no financial responsibility for itself nor the Academy beyond the following:
  - (a) providing appropriate award medals and SCAS certificates of merit for participants from each region, when requested; and
  - (b) providing one Head Chaperone to accompany all regional winners to the International Science and Engineering Fair wherever it is held.
5. Making housing reservations and, when feasible, travel arrangements for winners from all regions to the International Science and Engineering Fair. The expenses for all of these, except for the official SCAS appointed chaperone, are the responsibilities of each region.

#### SCIENCE WEEK COMMITTEE

The purpose of this committee is to bring about a week long, statewide focus on science and science-related activities.

The Committee accomplishes this by:

1. Applying for a proclamation of a "Science Week" from the Governor's Office.
2. Developing a packet of resource information for elementary, middle, and high school teachers, to be distributed through school superintendents, often using materials available for National Science Week.
3. Advertising Science Week and activities in the media, including the SCAS and SCJAS Newsletters.

## SECONDARY SCIENCE OR MATH TEACHER OF THE YEAR SELECTION COMMITTEE

This committee requests nominations and selects the Science or Mathematics Teacher of the Year; this was formerly designated the Cryovac Award. During the summer, the selection committee chair is appointed by the President who may appoint an additional committee member or members at that time. The committee chair then selects additional committee members as needed to complete the assigned task. For the sake of continuity, the chairman should be asked to serve for several consecutive years.

In late Autumn the committee chair solicits nominations from high school principals and heads of science and math departments across the state. Address labels from the State Department of Education are used for this purpose. A special form is provided for submitting the nominations, and a deadline is set in mid-November for the return of the nomination forms.

During the last week in November, nominees are informed and are requested to submit a portfolio to include: biographical information, performance information and two letters of recommendation. The forms are included in a packet of procedures that is passed from chairman to chairman. The deadline for returning the forms is mid-January.

The selection committee completes evaluation of the portfolios and arrives at a consensus winner by the end of February. The committee members grade each candidate on special forms using a scale of 300 points for a perfect score.

The committee chair totals the scores and determines the winner. The winner and runner-up are notified. Certificates containing biographical information are prepared and the certificates, a monetary award, and an expense-paid trip to the annual AAAS meeting are presented at the annual banquet of the Academy.

## UNDERGRADUATE RESEARCH AWARDS COMMITTEE

The Undergraduate Research Awards Committee is appointed annually by the President. The Chairperson, however, may submit to the President the names of those persons preferred to serve on the committee. The Chairperson and/or other Committee members may be asked to serve more than one year so as to provide greater continuity of membership activities. Except for the Chair, Committee members do not have to be members of the Council.

Funding for the awards is derived from the contributors from the several chapters of Sigma Xi within South Carolina. The Committee is responsible for administering awards for outstanding undergraduate research at colleges and universities within the State of South Carolina. The purpose of the Sigma Xi awards is to foster, encourage and recognize the work done by undergraduates in South Carolina on projects of exceptional scientific merit. The awards are made by a panel of two year college qualified scientists and are based on evaluation of the research presented by students before the Academy at its Annual Meeting.

The Committee's duties include arranging financial donations or other prizes for appropriate awards, developing criteria for awards, selecting judges, organizing judging activities, and making arrangements for awarding prizes.

## TWO YEAR COLLEGE COMMITTEE

The Two Year College Committee Chairperson is appointed annually by the President. The Chairperson may submit to the President the names of those persons preferred to serve on the committee. The Chairperson and/or other Committee members may be asked to serve more than one year so as to provide greater continuity of two year college activities.

The purposes of the committee are:

1. to promote membership in the Academy from among two-year college faculty, administrators and students;
2. to promote participation of two-year college faculty and students in Academy annual meetings, Junior Academy workshops, and MESAS workshops;
3. to promote the presentation of two-year college research at Academy meetings;
4. to organize a session (or sessions) for two-year college research presentations at the annual meeting of the Academy and, at its discretion, plan for a two-year college focus group or special session at the annual meeting or at another time as deemed appropriate by the Committee.
5. to administer awards for outstanding undergraduate research at two year colleges within the State of South Carolina. The purpose of the awards is to foster, encourage and recognize the work done by undergraduates on projects of exceptional scientific merit. The awards are based on evaluation of the research presented by students before the Academy at its annual meeting. The Committee will arrange for financial donations

or other prizes for appropriate awards, develop criteria for awards, select judges, organize judging activities and make arrangements for awarding prizes.

6. to be cognizant of and recommend to Council sources of awards for two-year college research projects, research presentations and teaching excellence; and
7. to recommend to Council ways to improve relationships between two-year college personnel and other Academy constituencies.

END  
SCAS MANUAL OF PROCEDURES

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The area of membership is listed above the academy member's name

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