ISSN-0096-414X

BULLETIN

of the

SOUTH CAROLINA ACADEMY OF SCIENCE

INCLUDING 2006 MEETING PROGRAM

VOLUME LXVIII
2006

THE SOUTH CAROLINA ACADEMY OF SCIENCE
FOUNDED 1924, COLUMBIA, SOUTH CAROLINA

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Publication Information: The SCAS *Bulletin* is distributed to members in conjunction with the annual meeting of the Academy.

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Contents

BIO 2010 Workshop
March 9th, 3pm

Hosted by:
South Carolina EPSCoR/IDeA Program
Dr. T.S. Little
Program Coordinator, SC-INBRE
State Manager, SC EPSCoR/IDeA State Office

Presented in coordination with the SCAS Annual Meeting

In order to assist South Carolina faculty with ideas for improvement of teaching methodologies to better prepare undergraduate students for future biological research careers, the South Carolina EPSCoR/IDeA program is pleased to host a free workshop focused on Bio 2010 on the afternoon of March 9, 2006. Dinner is provided for participants. This workshop is being held in coordination with the Annual Meeting of the South Carolina Academy of Sciences (SCAS) scheduled for the following day on the USC-Columbia campus.

A registration page has been set-up on the SC EPSCoR site for those intending to participate. Additional information is provided at (www.scepscor.org).

Additional information on the BIO 2010 imitative can be found online on the National Academic Press website (www.nap.edu).

SCHEDULE, SEVENTY-NINTH ANNUAL MEETING
SOUTH CAROLINA ACADEMY OF SCIENCE
MARCH 9TH AND 10TH , 2006
UNIVERSITY OF SOUTH CAROLINA, COLUMBIA, SOUTH CAROLINA

Thursday, March 9

6:00 PM - 8:00 PM	SCAS Council Meeting and Dinner	Carolina Room/ Capstone

Friday, March 10

7:30 AM - 2:00 PM	**Registration, SCAS & SCJAS**	Close/Hipp Lobby (Business School)
8:30 AM - 10:30 AM	**Poster Session, Authors' Present**	Close/Hipp Lower Lobby

8:30 AM - 10:45 AM	**Morning Session**	**Senior Academy**
Chemistry/Biochemistry I	Room 2	Close/Hipp Building
Chemistry/Biochemistry II	Room 8	Close/Hipp Building
Geography/Geological Sciences	Room 350	Close/Hipp Building
Math/Computer Science/Statistics	Room 351	Close/Hipp Building
Pharmacy/Psychology/Pub. Health	Room 534	Close/Hipp Building
Molecular and Cell Biology	Room 535	Close/Hipp Building
Nanoscience	Room 582	Close/Hipp Building
Physics/Astronomy	Room 583	Close/Hipp Building
Field Biology	Room 584	Close/Hipp Building

11:00 AM **Plenary Session** Belk Auditorium

Welcome: Dr. Mary Anne Fitzpatrick, Dean of the College of Arts and Sciences — Close/Hipp 005

Introduction of Speaker: Dr. Hans-Conrad zur Loye, President-elect and Program Chair

Keynote Presentation: **Dr. Davis Baird, USC Columbia**
"Images of the Nanoscale: What they say, what they suggest"

Awards Presentation: Dr. James Privett, President SCAS

12:15 PM - 12:45 PM	**SCAS Business Meeting**	Belk Auditorium Close/Hipp 005
12:45 PM - 1:30 PM	**SCJAS and SCAS Lunch**	Capstone Lobby/Campus Room

1:30 PM - 5:00 PM	**Afternoon Sessions**	**Senior Academy**
Chemistry/Biochemistry I	Room 2	Close/Hipp Building
Chemistry/Biochemistry II	Room 8	Close/Hipp Building
Pharmacy/Psychology/Pub. Health	Room 534	Close/Hipp Building
Molecular and Cell Biology	Room 535	Close/Hipp Building
Physics/Astronomy	Room 583	Close/Hipp Building
Field Biology	Room 584	Close/Hipp Building

5:30 PM - 7:30 PM	**Junior Academy Awards Banquet**	Campus Room/ Capstone

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Staging Room for SCAS/SCJAS	Room 302	Close/Hipp Building
Senior Academy Judges Room	Room 303	Close/Hipp Building
Junior Academy Judges Room	Room 337	Close/Hipp Building
Questions/Information/Extra Equipment	Room 302	Close/Hipp Building

2006 KEYNOTE PRESENTATION

"**Images of the Nanoscale: What they say, what they suggest**"

Professor Davis Baird

The 2006 SCAS meeting keynote presentation will be given by Prof. Davis Baird. Davis Baird is Dean of the South Carolina Honors College and Director of the *nano*Science and Technology Studies Group in the University of South Carolina NanoCenter. He received his PhD (1981) from Stanford University's Program in Philosophy of Science, Philosophy of Language and Logic. In addition, he has an MA (1981) from Stanford and a BA (1976) from Brandeis University. His research has focused on the history and philosophy of scientific instruments, those developed for analytical chemistry during the 20th century, and more recently the instruments that make nanotechnology possible. Here he pursues a familial interest being the son of Walter Baird, co-founder of one of the early developers of spectrographic instrumentation, Baird Associates. He leads an NSF funded interdisciplinary team of 20 researchers from 10 departments in 6 colleges at USC, working in cooperation USC's NanoCenter, on the societal and ethical interactions of nanotechnology. He is the author of *Thing Knowledge: A Philosophy of Scientific Instruments* (University of California Press, 2004) and *Inductive Logic: Inferring the Unknown* (Prentice Hall, 1992; Pearson Publishing, 1999). With Alfred Nordmann and Joachim Schummer he is the co-editor of *Discovering the Nanoscale* (IOS Press, 2004, also available at http://cms.ifs.tu-darmstadt.de/fileadmin/phil/nano/nano.html). He also is co-editor of two collections published in the *Boston Studies in the Philosophy of Science* series: *Heinrich Hertz: Classical Physicist, Modern Philosopher* (Kluwer, 1994) and *Philosophy of Chemistry: Synthesis of a New Discipline* (Springer, 2006). He edits *Techné: Research in Philosophy and Technology*, Journal of the Society for Philosophy and Technology, and is manager of the listserv, philchem (@listserv.sc.edu) devoted to the philosophy of chemistry. He can be reached at db@sc.edu.

PRESIDENT ASKS MEMBERS TO WORK ON INCREASING MEMBERSHIP

Founded in 1924, the South Carolina 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, small and large businesses, financial institutions, and institutions of higher education. One reason for this broad spectrum of support for SCAS is that, individually and collectively, we share a deep commitment to stimulate the creative abilities of youth and adults of our State and to provide experiential learning opportunities that allow for the development of these talents.

Below is a summary of activities that are sponsored and supported by SCAS and its members.

ACTIVITIES OF THE SOUTH CAROLINA ACADEMY OF SCIENCE:

Your Academy of Science sponsors
1. the Bulletin of the South Carolina Academy of Science, a professional society journal.
2. the South Carolina on-line Journal, a professional society journal.
3. eight regional science fairs.
4. the South Carolina Junior Academy of Science (SCJAS)*.
5. the Middle/Elementary School Academy of Science (MESAS)**.
6. awards for excellence in science research and awareness.
7. awards for excellence in science or mathematics teaching at the high school level.

Your Academy of Science provides
1. opportunities for principle investigators to articulate research papers at the annual meeting.
2. opportunities for college undergraduate and graduate students to articulate research papers at the annual meeting.

continued

3. a scientific resource bank for issues relating to scientific research, science education, and public policy.
4. a forum for nationally and internationally prominent guest speakers at the annual meeting.
5. a forum for the vertical integration of scientific knowledge among senior scientists, college professors, teachers, college students, high school students and the citizens of South Carolina.

*The South Carolina Junior Academy of Science has two workshops annually where students have the opportunity to learn more about science. In addition, student members present research papers and compete for awards in fifteen categories at the annual meeting. SCJAS encourages the creation and development of science clubs in the high schools. It provides high school students with unique opportunities for leadership development and increased opportunities for scholarship aid for higher education.

**The Middle/Elementary Academy of Science has regional fall workshops where students have the opportunity to learn more about science. Students are eligible to present at the SCAS annual meeting. They can participate in a mail-in contest and win prizes. Also they are eligible to become Young Researchers.

I would like to ask you to recruit a new member by sharing the summary of activities. As a result of recruiting a new member, you allow the Academy to maintain and widen its outreach through sponsored activities.

Dr. James E. Privett
President

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

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

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Pendleton SC 29670

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SOUTH CAROLINA ACADEMY OF SCIENCE
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

South Carolina Academy of Science

2005 Award For Excellence in Secondary School Science or Mathematics Teaching

Maureen M. Albright
North Central High School, Kershaw, SC

The SCAS Award for Excellence in Secondary School Science or Mathematics Teaching for 2005 was presented to Mrs. Maureen M. Albright at the annual meeting held at Winthrop University. Mrs. Albright teaches mathematics at Lakewood High School in Sumter. For 22 years she has conveyed her passion for mathematics to her students through two credos: "Math is Power" and "Math is Beautiful." She has been named Teacher of the Year and Tandy Outstanding Teacher as well as being recipient of Horance Mann and GTE grants. She is sponsor for the Math Honors Club and tutors all who need her every morning at the Homework Help Center. She is an expert on SC Math Standards and tutors those who haven't yet passed the SC Exit Exam. Her work on curriculum development, SAT preparation and "Leadership Academics" has helped her school receive an "Excellent" rating on the SC Schools' Report Card. Her principal says that "Mrs. Albright is a fabulous math teacher with the ability to connect with students utilizing amazing instructional skills that promote student achievement." Mrs. Albright modestly says that she is merely a facilitator who helps students in their search for knowledge; they are her greatest challenge and her greatest reward.

Governor's Award for Excellence in Science 2006

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 Michelins 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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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

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
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Joseph Manson, 1998. ..... Clemson University
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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

2005 Governor's Award for Excellence in Science Awareness

The 2005 Governor's Award for Science Awareness is awarded to both

Dr. Gabriella Virella, Medical University of South Carolina,
and
Dr. Thomas Reeves, Midlands Technical College.

Dr. Gabriel Virella

Dr. Gabriel Virella obtained his MD degree at the University of Lisbon, Portugal, in 1967. He did post-doctoral studies in Immunology at the Dept. of Experimental Pathology, University of Birmingham, England (1968-69) and at the National Inst. for Medical Research, Mill Hill, London, England (1969-1970). From 1970 to 1975 he was a Researcher at the Gulbenkian Institute of Science, Oeiras, Portugal. In 1974 he obtained a Doctorate in Medicine (Microbiology), also at the University of Lisbon. He moved to the Medical University of South Carolina in 1975, where he became a Professor of Immunology and Microbiology in 1980. He is also an Adjunct Professor of Immunology in the University of Lisbon, Portugal.

He has published 220 articles on topics related primarily to immunology, with particular emphasis on immunoglobulin structure and abnormalities, immune complex diseases, and the involvement of autoimmune phenomena in the pathogenesis of atherosclerosis. He has described original techniques for the isolation and characterization of antigen-antibody complexes, enzymoimmunoassays for tetanus and diphtheria antibodies, and for modified LDL antibodies. He has also developed capture assays for different LDL modifications whose clinical relevance is being investigated. His research is funded by the NIH, VA, and Juvenile Diabetes Research Foundation.

Another significant aspect of his career has been his involvement on the education of medical and graduate students. His efforts in teaching have been rewarded with the AAMC/AOA Distinguished Teacher Award (2004), the MUSC Health Science Foundation Teaching Excellence Award (1996) and eight Golden Apple Awards. In 1988, he was elected to the medical honor society AOA and has served as Councilor of the Medical University-AOA Branch since 1993. He has published three textbooks; "Introduction to Medical Immunology", Marcel Dekker, NY, currently on its fifth edition, "NMS Microbiology and Infectious Diseases", 3rd Ed, Williams & Wilkins, 1997, and "NMS Q&A Microbiology, Immunology, and Infectious Diseases", Lippincott Williams & Wilkins, 1999.

During his long tenure as course director and later as coordinator of the Infection and Immunity course, Dr. Virella developed and introduced many innovative features, particularly exercises for case-based learning and computer-based cases for Infectious Diseases. As a year 2 Coordinator for the College of Medicine, he played a key role in curricular reform. He presented seminars and workshops across the nation on his innovative approaches to teaching Immunology and Microbiology. In 1993 and 1997 he served as local host and co-organizer of a meeting on "New Educational Strategies For The Basic Sciences", co-sponsored by the AAMC:GEA's Basic Science Education Forum

and the Medical University of South Carolina. He is a Fellow of the American Academy of Microbiology since 1980, and a member of the Clinical Immunology Society. He has been Section Editor for Clinical Immunology (formerly Clinical Immunology and Immunopathology) since 1989. He is also a member of the editorial boards of Journal of Clinical Laboratory Analysis and Clinical and Diagnostic Laboratory Immunology.

Dr. Thomas Reeves

For the past 26 years Dr. Reeves has served as a science teacher in South Carolina; ten years at Brookland-Cayce High School and the past fifteen years at Midlands Technical College, while also serving as an adjunct biology instructor at the University of South Carolina. During this time, he has taught courses in physical science, chemistry, Advanced Placement biology, general biology, ecology, human anatomy and physiology, zoology, and microbiology. Throughout his career, Dr. Reeves has been actively involved with the development of innovative science courses and programs including Biology 206; a community-based Ecology Lab that allowed environmental science to be offered for the first time as a laboratory science course in the technical college system, and Biology 290; a research-based internship program that has allowed more than 90 Midlands Technical College students to gain research and job experience in a dozen biological fields.

As a secondary and technical college science instructor, Dr. Reeves has consistently stressed the importance of research in science education and served as mentor to more than 150 student research projects at Brookland-Cayce High School, as well as more than 90 student research projects at Midlands Technical College. The majority of these students have then presented their research at professional meetings or competitions, in many cases receiving state and national recognition.

For the past five years, Dr. Reeves has developed and served as Coordinator of ***Preparing Future Faculty*** at the University of South Carolina, a program designed to improve the instructional skills and experience of doctoral students in math and science. More than 100 graduate students in seven disciplines have participated in the program, and seven have completed all certification requirements outlined by the program.

Throughout his career, Dr. Reeves has been actively involved with science organizations; giving more than 50 presentations at meetings of the South Carolina Academy of Science, the South Carolina Junior Academy of Science, the South Carolina Science Council, the National Science Teacher's Association, the National Association of Biology Teachers and the South Carolina Technical Education Association. As a member of the South Carolina Academy of Science, Dr. Reeves served as a council member for ten years, and as Executive Director of the South Carolina Junior Academy of Science for five years, during which time he planned and organized more than fifteen SCJAS workshops attended by thousands of South Carolina science students and teachers; while at the same time serving as editor of the ***SCJAS Newsletter***. Dr. Reeves also helped to form the SCAS Two-Year College Committee and encouraged participation by two-year college math and science faculty from throughout the state by coordinating and hosting the first meeting of two-year college science faculty at Midlands Technical College.

For his many accomplishments, Dr. Reeves received the ***Helms Citation of Excellence*** from the South Carolina Academy of Science in 2001.

2005 Governor's Award for Excellence in Scientific Research

The 2005 Governor's Award for Excellence in Scientific Research goes to

Dr. Franklin Berger

University of South Carolina Columbia.

In his 19 years at the University of South Carolina, Dr. Berger has established himself as an esteemed authority in the area of colon cancer in the USA, and one of the top scientists in this field worldwide.

Dr. Berger's research program centers on the molecular biology of growth and maintenance of tumors in the colon and mechanisms by which they can be controlled. His work has far-reaching significance for a variety of areas: the mechanisms by which chemotherapeutic agents control the growth of cancer cells; the role of whole tissue complexes in maintenance and growth of tumors; and signaling mechanisms that are critical for tumor viability.

Dr. Berger is the author of over 80 peer-reviewed publications and trained over 20 Ph.D.s and Postdoctoral Fellows. Over the past twenty years, Dr. Berger has served the National Institutes of Health on seventeen Review Panels and five Site Visits. In 1990, he was a Fulbright Fellow at the University of Lund, Sweden, and in 1999 he received the University of South Carolina's Educational Foundation Research Award for Science, Mathematics and Engineering. He has generated over $15 million in extramural grant support for his research program, including an NIH Cobra Grant to support the USC Center for Colon Cancer Research. He presently is the George H. Bunch, Sr. Professor of Science and, following six years as Chair of the Department of Biological Sciences, he is now the Director of the Center for Colon Cancer Research.

In summary, Dr. Berger's scholarly work has brought great recognition to South Carolina in the field of molecular biology of cancer. The results of his research provide invaluable contributions to better understand both the nature and growth of cancer of the colon. His studies on the basic relationship between cancer cells and the normal cells that surround and associate with the cancer cells have broken new ground. His results will help lead to both a better understanding of how cancers start and progress and how we can disrupt these processes and eventually provide safe, effective cures for this deadly disease.

2005 Governor's Young Scientist Award for Excellence in Scientific Research

The 2005 Governor's Young Scientist Award for Excellence in Scientific Research goes to
Dr. Ya-Ping Sun of Clemson University.

Dr. Sun received his Ph.D. in Physical Chemistry from Florida State University in 1989, and conducted postdoctoral research at the University of Texas before accepting a faculty position at Clemson in 1992. He rose rapidly through the ranks, being promoted to full professor in only seven years.

Dr. Sun is widely recognized as one of the very best young faculty members in the U.S. His record of accomplishments is phenomenal for one so early in his career. His awards include the 1999 College of Engineering and Science Award for Excellence in the Sciences and 2001 Provost's Award for Scholarly Achievement. In 1995 he was named as one of the "15 Brightest Starts in Analytical Spectroscopy" by the Editorial Board of *Spectroscopy*, and he recently became the Frank Henry Leslie Chair of Natural & Physical Sciences. Since coming to Clemson he has published more than 140 peer-reviewed articles in national and international journals, plus numerous reviews and book chapters. He is principal investigator on nine grants totaling $1.8 million dollars in current funding for his research, and is co-investigator on a $540,000 USDA grant. Dr. Sun has been instrumental in several state-wide initiatives to improve the infrastructure for science and technology in the state and at Clemson University, including a recently awarded $3 million dollar grant from the National Science Foundation. He also is the Chair of the Frank Henry Leslie Natural & Physical Sciences Committee at Clemson University.

Dr. Sun's research interests include organic photochemistry, reactions in supercritical fluids, and the synthesis of new fullerene and carbon nanotube derivatives. He is a leading expert in the application of these interesting carbon materials in biology and optical materials in substituted polymers. More recently he has expanded his interests to include nanoscale materials. These materials, consisting of particles with dimensions in the nanometer range, have significantly different optical and electronic properties from normal materials and Professor Sun has made many exciting new discoveries for their use in optical, electronic and biological applications. The strength of his contributions to this field has led to collaborations with research groups at the University of Rochester, Duke University, Southern Methodist University, NASA Langley Research Center, Air Force Research Laboratory, Army Research Laboratory, Oak Ridge National Laboratory, and Idaho National Engineering and Environmental Laboratory.

In addition to his outstanding research accomplishments, Dr. Sun serves as an outstanding mentor to his students. While his research group, which includes 15 graduate students and 5 postdoctoral associates, is among the largest and best directed in the department of chemistry, Professor Sun also finds time to encourage a large number of undergraduate students to get involved in research. He currently serves as the principal investigator of a multidisciplinary National Science Foundation - Research Experience for Undergraduates program at Clemson, and over the years he has led over 35 undergraduates in his research group.

TOPICAL SESSIONS

Presenter names are in **bold text**

CHEMISTRY AND BIOCHEMISTRY I
ROOM: 2 CLOSE/HIPP BUILDING
PRESIDING: MIKE LUFASO, UNIVERSITY OF SOUTH CAROLINA

8:30 - 8:50 AM
MOLECULAR DYNAMICS SIMULATIONS TO EXPLORE THE EFFECT OF CHEMICAL REACTIONS ON THE BOMBARDMENT OF Si WITH C_{60}, **David B. Kingsbury** and Kristin D. Krantzman, Department of Chemistry and Biochemistry, College of Charleston

8:50 - 9:10 AM
SYNTHESIS OF HETEROCYCLIC COMPOUNDS USING NEW METHODOLOGY WITH DIANIONS OF BETA-DIKETONES, **John D. Knight**, Andrei R. Straumanis and Charles F. Beam, Department of Chemistry and Biochemistry, College of Charleston

9:10 - 9:30 AM
MODIFIED PREPARATIONS OF PHENYL HYDRAZINECARBOXYLATE AND CARBOPHENOXYHYDRAZONES, AND THE MULTIPLE ANION SYNTHESIS OF DIHYDROPYRAZOLINONES, **Derrik Weddle**, John D. Knight, Julianne McLaughlin, Andrei R. Straumanis and Charles F. Beam, Department of Chemistry and Biochemistry, College of Charleston

9:30 - 9:45 AM Break

9:45 - 10:05 AM
CRYSTAL GROWTH OF NOVEL LANTHANIDE CONTAINING OXIDES FROM HYDROXIDE MELTS, **Samuel J. Mugavero III**, Mark D. Smith and Hans-Conrad zur Loye, Department of Chemistry and Biochemistry, USC Columbia

10:05 - 10:25 AM
HIGH-PRESSURE SYNCHROTRON X-RAY DIFFRACTION USING A DIAMOND ANVIL CELL, **Michael W. Lufaso**[1], René Macquart[1], Yongjae Lee[2], Tom Vogt[1], and Hans-Conrad zur Loye[1], [1]Department of Chemistry and Biochemistry, USC Columbia, [2]Department of Earth System Sciences, Yonsei University, Seoul, South Korea

10:25 - 10:45 AM
SYNTHESIS AND CHARACTERIZATION OF MULTILAYER $Bi_{1.6}Pb_{0.4}Sr_{1.85}Ca_nCu_{2n+1}O_x$, **Nathaniel Robinson**, Derrick L. McCrae and Jafar Amirzadeh, Division of Natural Sciences and Mathematics, Morris College

1:30 - 1:50 PM
IN SITU SCANNING TUNNELING MICROSCOPY STUDIES OF BIMETALLIC CLUSTER GROWTH: Pt-Rh ON TiO_2(110), **J. B. Park**, J. S. Ratliff and D. A. Chen, Department of Chemistry and Biochemistry, USC Columbia

1:50 - 2:10 PM
PRECISION IN MULTIVARIATE OPTICAL IMAGING, **M. N. Simcock** and M. L. Myrick, Department of Chemistry and Biochemistry, USC Columbia,

2:10 - 2:30 PM
SPECTRAL RESOLUTION IN MULTIVARIATE OPTICAL COMPUTING, **Luisa T. M. Profeta** and Michael L. Myrick, Department of Chemistry and Biochemistry, USC Columbia

2:30 - 2:45 PM Break

2:45 - 3:05 PM
NEW INDICATORS FOR STRONG BASES: IMPROVED DIPHENYLACETIC ACID DERIVATIVES, **L. Nesbit**, N. Willis, O. Sotola and D. Magnin, Division of Natural Sciences and Mathematics, Morris College

3:05 - 3:25 PM
DIOXOMOLYBDENUM(VI) COMPLEXES WITH S,O-DONOR LIGANDS, **Lindsay Strand** and Kutty Pariyadath, Department of Chemistry and Physics, USC, Aiken

3:25 - 3:45 PM
REACTIONS OF NO AND CO ON Pt AND Rh BIMETALLIC NANOCLUSTERS SUPPORTED BY TiO_2 (110), **J. S. Ratliff**, J. B. Park, S. Ma and D. A. Chen, Department of Chemistry and Biochemistry, USC Columbia

CHEMISTRY AND BIOCHEMISTRY II
ROOM: 8 CLOSE/HIPP BUILDING
PRESIDING: JOHN GOODWIN, COASTAL CAROLINA UNIVERSITY

8:30 - 8:50 AM
BAEYER-VILLIGER OXIDATION OF KETONES USING SODIUM PERCARBONATE, **Amber Markley** and Ann Willbrand, Department of Chemistry and Physics, USC, Aiken

8:50 - 9:10 AM
CATALYTIC DECOMPOSITION OF PEROXYNITRITE BY NAFION-BOUND IRON PORPHYRINS, **Lindsay P. Smith**[1], Mark D. Sides[1], John A. Goodwin[1] and John Dawson[2], [1]Department of Chemistry and Physics, Coastal Carolina University, [2]Department of Chemistry and Biochemistry, USC Columbia

9:10 - 9:30 AM
HPLC ANALYSIS OF GREEN TEA POLYPHENOL EXTRACTS FROM SKIN CELLS AND SALIVA HPLC ANALYSIS OF GREEN TEA POLYPHENOL EXTRACTS FROM SKIN CELLS AND SALIVA, **Danielle Britt**[1], Ann Willbrand[1], Stephen Hsu[2], John Nechtman[2] and Haiyan Qin[2], [1]Department of Chemistry and Physics, USC, Aiken, [2]Department of Oral Biology, Medical College of Georgia

9:30 - 9:45 AM Break

9:45 - 10:05 AM
CHARACTERIZATION OF BALL-POINT PEN INK BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY AND UV/VISIBLE MICROSPECTROPHOTOMETRY, **Natalya O. Hall**, Amy R. Stefan and Stephen L. Morgan, Department of Chemistry and Biochemistry, USC Columbia

10:05 - 10:25 AM
CHARACTERIZATION OF THE CHEMICAL COMPOSITION OF LATENT FINGERPRINTS BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY, **Rachael E. Hipp**, Brittany Hartzell-Baguley, Neal R. Morgan and Stephen L. Morgan, Department of Chemistry and Biochemistry, USC Columbia

10:25 - 10:45 AM

HORSE SPLEEN FERRITIN AS BUILDING BLOCK FOR CHEMOSELECTIVE MODIFICATION AND SELF-ASSEMBLY, **Qingbing Zeng** and Qian Wang, Department of Chemistry and Biochemistry, USC Columbia

1:30 - 1:50 PM
ION-PAIRED COMPLEXES OF IRON PORPHYRINS AND NAFION® MONOMERS IN SOLUTION, **Mark D. Sides**[1], John A. Goodwin[1] and John Dawson[2], [1]Department of Chemistry and Physics, Coastal Carolina University, [2]Department of Chemistry and Biochemistry, USC Columbia

1:50 - 2:10 PM
H TRANSFER IN 2-NITROPHENOL NEUTRAL AND ION: A COMBINED AB INITIO G2 (MP2) AND RRKM STUDY, **John S. Riley**, DSB Scientific Consulting

2:10 - 2:30 PM
PREPARATION AND ELECTROCHEMISTRY OF IRON DERIVATIVES OF NEW N-ALKYL-SUBSTITUTED TETRAPYRIDYL(2) PORPHYRINS, **Nicole A. Kuentzel**, Nicole Honsaker and John A. Goodwin, Department of Chemistry and Physics, Coastal Carolina University

2:30 - 2:45 PM Break

2:45 - 3:05 PM
SYNTHESIS & CHARACTERIZATION OF A COVALENTLY LINKED POROUS POLY(BORONATE) NETWORK, **R. William Tilford** and John J. Lavigne, Department of Chemistry and Biochemistry, USC Columbia

3:05 - 3:25 PM
PREPARATION OF NEW N-ALKYL-SUBSTITUTED TETRAPYRIDYL(2) PORPHYRINS, **Nicole D. Honsaker** and John A. Goodwin, Department of Chemistry and Physics, Coastal Carolina University

3:25 - 3:45 PM
PREPARATION AND OXO-TRANSFER REACTIONS OF NAFION-BOUND [CoTMpyP($_2$)(NO_2)], **Jennifer L. Coor** and John A. Goodwin, Department of Chemistry and Physics, Coastal Carolina University

GEOGRAPHY AND GEOLOGICAL SCIENCES
ROOM: 350 CLOSE/HIPP BUILDING
PRESIDING: TO BE ANNOUNCED

8:30 - 8:50 AM
RUSSIA'S RAILROADS: LESSONS FROM AMERICA—PART 2 ECONOMIC DEVELOPMENT, **Clinton H. Whitehurst Jr.**, Strom Thurmond Institute, Clemson University

8:50 - 9:10 AM
LEAD UPTAKE BY PLANTS IN CONTAMINATED SOIL, **Amanda Spencer** and James Spell, Department of Biological and Physical Sciences, Columbia College

MATH, COMPUTER SCIENCE AND STATISTICS
ROOM: 351 CLOSE/HIPP BUILDING
PRESIDING: JOHN BOWLES, UNIVERSITY OF SOUTH CAROLINA

8:30 - 8:50 AM
GENERAL OUTLIER DETECTION FOR A HOMOGENEOUS POISSON PROCESS WITH SUM QUOTA ACCRUAL, **Jonathan T. Quiton**, Edsel A. Peña and James D. Lynch, Department of Statistics, USC Columbia

8:50 - 9:10 AM
SIMULATION MODEL: CAN WE PREDICT PATIENT SUCCESS IN AN ASSISTED REPRODUCTIVE TECHNOLOGY (ART) CYCLES?, **Nilanjana Rahman**[1], Paul Hyden[1], Herman Senter[1], H. Lee Higdon III[2] and William R. Boone[2], [1]Department of Mathematics Sciences, Clemson University, [2] Department of Obstetrics and Gynecology, Division of Reproductive Endocrinology and Infertility, Greenville Hospital System University Medical Center

9:10 - 9:30 AM
VIDEO GAMES AND SOFTWARE ENGINEERING: A CASE STUDY, **Matthew Ginley**, John B. Bowles and Caroline M. Eastman, Department of Computer Science and Engineering, USC Columbia

9:30 - 9:45 AM Break

9:45 - 10:05 AM
EXTENDING WEBCRED: ASSESSING THE CREDIBILITY OF WEB SITES, **Christopher Hopper**[1], Marcus Wassmer[2], Caroline M. Eastman[3] and John B. Bowles[3], [1]Benedict College, [2]Evansville University, [3]Department of Computer Science and Engineering, USC Columbia

10:05 - 10:25 AM
ACCESS CONTROL ON THE SEMANTIC WEB, **Brittany Smith**[1], Csilla Farkas[2], Caroline M. Eastman[2] and John B. Bowles[2], [1]Furman University, [2]Department of Computer Science and Engineering, USC Columbia

10:25 - 10:45 AM
CONCLUSIONS ABOUT THE EFFECT FREEZING LOCATION HAS ON POST-THAW DEVELOPMENT OF HUMAN EMBRYOS MAY DEPEND ON STATISTICAL APPROACH USED TO ANALYZE THE DATA, **Timothy C. Teitloff**[1], Jane E. Johnson[2], H. Lee Higdon III[2] and William R. Boone[2], [1]Department of Mathematical Sciences, Clemson University, [2] Department of Obstetrics and Gynecology, Division of Reproductive Endocrinology and Infertility, Greenville Hospital System University Medical Center

PHARMACY, PSYCHOLOGY AND PUBLIC HEALTH
Room: 534 Close/Hipp Building
Presiding: Sarah Michele Harmon, University of South Carolina Aiken

8:30 - 8:50 AM
THE TOXICOLOGICAL EFFECTS OF POST-HURRICANE KATRINA SOIL ON EISENIA FOETIDA, **Kurtis Drake**, Doug Wyatt and S. Michele Harmon, Department of Biology and Geology, USC Aiken

8:50 - 9:10 AM
AN OPINION COLUMN, ANGER, RESENTMENT AND THE FIRST AMENDMENT: A CASE STUDY IN FREEDOM OF THE PRESS AT WINTHROP UNIVERSITY, **Larry Timbs**, Department of Mass Communication, Winthrop University

9:10 - 9:30 AM
INTEGRATION OF CHRISTIAN FAITH IN BUSINESS CLASSES, **Miren Ivankovic**, Southern Wesleyan University

9:30 - 9:45 AM Break

9:45 - 10:05 AM
HIV-PROTEINS AND ITS NEUROBEHAVIORAL EFFECTS IN NEONATAL RATS, **Sylvia Fitting**, Rosemarie M. Booze, James R. Coleman and Charles F. Mactutus, Department of Psychology, USC Columbia

10:05 - 10:25 AM
DOES THE NUMBER OF OOCYTES RETRIEVED SIGNIFICANTLY IMPACT THE CLINICAL PREGNANCY RATES REALIZED IN ASSISTED REPRODUCTIVE TECHNOLOGY (ART) PROCEDURES?, **Megan L. Koehler**[1], Herman F. Senter[1], H. Lee Higdon III[2] and William R. Boone[2], [1]Department of Mathematical Sciences, Clemson University, [2]Department of Obstetrics and Gynecology, Division of Reproductive Endocrinology and Infertility, Greenville Hospital System, University Medical Center

10:25 - 10:45 AM
FLEXIBLE OR RIGID CATHETERS FOR INTRAUTERINE INSEMINATION: SHOULD ECONOMICS PLAY A PART?, **J. Glenn Proctor Jr.**[1], H. Lee Higdon III[1], William R. Boone[1] and Kit N. Simpson[2], [1]Department of Obstetrics and Gynecology, Division of Reproductive Endocrinology and Infertility Greenville Hospital System University Medical Center, [2]Department of Health Administration & Policy, College of Health Professions Medical USC Columbia

1:30 - 1:50 PM
EXPECTATIONS FOR PREGNANCY FOLLOWING SURGICAL SPERM ASPIRATION, **Angela M. Houwing**, H. Lee Higdon III, Lawrence K. Hill and William R. Boone, Department of Obstetrics and Gynecology, Division of Reproductive Endocrinology and Infertility, Greenville Hospital System, University Medical Center

1:50 - 2:10 PM
ANTITUMOR ACTIVITY OF SELECTED DERIVATIVES OF 2-(1-PHENYL-1H-PYRAZO-5-YL)BENZENESULFONAMIDES, John Gum[1], Darby Lyles[1], **N. D. Camper**[1] and Charles F. Beam[2], [1]Department of Entomology, Soils and Plant Sciences, Clemson University, [2]Department of Chemistry and Biochemistry, College of Charleston

MOLECULAR AND CELL BIOLOGY
Room: 535 Close/Hipp Building
PRESIDING: Holly LaVoie University of South Carolina

8:30 - 8:50 AM
GENE EXPRESSION IN LB400, **Frank T. Spradley** and James R. Yates, Department of Biology and Geology, USC, Aiken

8:50 - 9:10 AM
SEQUENCE ANALYSIS OF THE LEFT END OF THE BPH CLUSTER, **Erin T. Jones** and James R. Yates, Department of Biology and Geology, USC Aiken

9:10 - 9:30 AM
CHARACTERIZATION OF AEROSOLIZED BACTERIA FROM AFRICAN DUST, **Christina A. Wilson**[1], Garriet Smith[1] and Robin Brigmon[2], [1]Department of Biology, USC Aiken, [2]Savannah River National Laboratory

9:30 - 9:45 AM Break

9:45 - 10:05 AM
THE SURVIVAL OF ORGANISMS FROM AFRICAN DUST: CHARACTERIZATION OF THE AEROMYCOLOGY OF AFRICAN DUST IN DUST AND NON-DUST EVENTS, **Fernando F. Blanco** and Garriet Smith, Department of Biology and Geology, USC Aiken

10:05 - 10:25 AM
CHEMICAL ANALYSIS OF PIGMENTED SCLERITES FROM DISEASED CORAL SEA FANS, **Melissa J. Warren**[1], Chad L. Leverette[1] and Garriet Smith[2], [1]Department of Chemistry and Physics, [2]Department of Biology and Geology, USC Aiken

10:25 - 10:45 AM
CHARACTERIZATION OF HIV-1 VIF EXPRESSION, **Connie Arthur** and William H. Jackson, Department of Biology and Geology, USC Aiken

1:30 - 1:50 PM
CHARACTERIZATION OF THE RETROVIRAL VECTOR pLNPolIX, **Zachary D. Wilson** and William H. Jackson, Department of Biology and Geology, USC Aiken

1:50 - 2:10 PM
INHIBITORY EFFECTS OF FRUIT EXTRACTS ON MCF-7 BREAST CANCER CELL LINE PROLIFERATION, **Diana Ivankovic**, Sara Dunaway and Jennifer McAbee, Anderson University

2:10 - 2:30 PM
DEVELOPMENTAL EXPRESSION OF GALECTIN-3 IN THE RAT OVARY AND TESTIS, **Holly A. LaVoie**[1], William McAmis, Jr.[1] and Samir Raychoudhury[2], [1]Department of Cell and Developmental Biology and Anatomy, USC School of Medicine, [2]Department of Biology, Chemistry and Environmental Health Science, Benedict College

2:30 - 2:45 PM Break

2:45 - 3:05 PM
FLOW CYTOMETRIC ANALYSIS OF MCF-7 CELL DNA FOLLOWING TREATMENT WITH 17*b*-ESTRADIOL AND TAMOXIFEN, **Kirk Kangaloo** and Samir Raychoudhury, Department of Biology, Chemistry and Environmental Health Science, Benedict College

3:05 - 3:25 PM
PREPUBERAL EXPRESSION OF GONADOTROPINS IN MICE, **Tonya Turner**, Marie Cox, Jennifer Richter-Maze, and T.D. Maze, Department of Biology, Lander University

NANOSCIENCE
ROOM: 582 CLOSE/HIPP BUILDING
PRESIDING: ALFRED NORDMANN, TECHNISCHE UNIVERSITÄT DARMSTADT

8:30 - 8:50 AM
SYNTHESIS AND CHARACTERIZATION OF LAYERED OXIDE POLYMER NANOCOMPOSITES, **Tara J. Hansen**, A. Peter Barber, Jisheng Ma, Harry J. Ploehn and Hans Conrad zur Loye, USC Nanocenter, USC Columbia

8:50 - 9:10 AM
SYNTHESIS OF PLANT VIRUSES BASED COMPOSITE MATERIALS, **Qian Wang**, Department of Chemistry and Biochemistry, USC Columbia

9:10 - 9:30 AM
INVISIBLE ORIGINS OF NANOTECHNOLOGY - HERBERT GLEITER AND THE NEGLECTED ROLE OF MATERIALS SCIENCE, **Alfred Nordmann**[1] and Hans-Conrad zur Loye[2], [1]Institut für Philosophie, Technische Universität Darmstadt, [2]Department of Chemistry, USC Columbia

9:30 - 9:45 AM Break

9:45 - 10:05 AM
CHARACTERIZATION OF SILVER NANOROD ARRAYS AS SUBSTRATES FOR SURFACE-ENHANCED INFRARED ABSORPTION (SEIRA) SPECTROSCOPY,

Stephanie Jacobs[1], Chad L. Leverette,[1] Stephen Chaney[2], Yiping Zhao[2], Sarat Shanmukh[3] and Richard Dluhy[3], [1]Department of Chemistry and Physics, USC, Aiken, [2]Department of Physics and Astronomy, and Nanoscale Science and Engineering Center, University of Georgia, [3]Department of Chemistry and Nanoscale Science and Engineering Center, University of Georgia

PHYSICS AND ASTRONOMY
ROOM: 583 CLOSE/ HIPP BUILDING
PRESIDING: MILIND KUNCHUR, UNIVERSITY OF SOUTH CAROLINA

8:30 - 8:50 AM
NEUTRINO-NUCLEUS REACTIONS RELEVANT TO THE ATMOSPHERIC AND K2K EXPERIMENT, **Barbara Szczerbinska**[1], Kuniharu Kubodera, Fred Myhrer[1], Toru Sato[2] and T.-S.H. Lee[3], [1]Department of Physics and Astronomy, USC Columbia, [2]Department of Physics, Osaka University, [3]Physics Division, Argonne National Laboratory

8:50 - 9:10 AM
THE EVOLUTION OF ELEMENTS IN GALAXIES, **Joseph Meiring** and Varsha Kulkarni, Department of Physics and Astronomy, USC Columbia

9:10 - 9:30 AM
SHADOWS OF GALAXIES: QUASAR ABSORPTION LINES AND GALAXY EVOLUTION, **Varsha P. Kulkarni**, Joseph D. Meiring and Soheila Gharanfoli, Department of Physics and Astronomy, USC Columbia

9:30 - 9:45 AM Break

9:45 - 10:05 AM
OBSERVATIONS OF THE SLOWLY PULSATING B STAR HD 1976, **Joe Bramlett** and Robert Dukes, Jr., Department of Physics and Astronomy, College of Charleston

10:05 - 10:25 AM
A STUDY OF HD21071 BASED ON NEW DATA, **Melissa Sims** and Robert Dukes Jr., Department of Physics and Astronomy, College of Charleston

10:25 - 10:45 AM
HOW DO WE KNOW WHAT WE KNOW?: A STUDY OF TWO VARIABLE STARS AND METHODS OF VALIDATING RESULTS, **Sarah Sonnett** and Robert Dukes, Jr., Department of Physics and Astronomy, College of Charleston

1:30 - 1:50 PM
DOUBLE EXPOSURE HOLOGRAPHIC INTERFEROMENTRY, **Willie Moultrie** and Fred Watts, Department of Physics and Astronomy, College of Charleston

1:50 - 2:10 PM
ELECTRICAL CHARACTERISTICS OF TYPE-II SEMICONDUCTORS, **M. N. Kunchur**[1], G. Saracila, D. A. Arcos[1], Y. Cui[2], A. Pogrebnyakov[2], P. Orgiani[2] and X. X. Xi[2], [1]Department of Physics and Astronomy, USC Columbia, [2]Department of Physics and Materials Sciences, Pennsylvania State University

2:10 - 2:30 PM
PROBING ELECTRIC FIELD GENRATION IN SUPERCONDUCTORS USING A DC TRANSFORMER, **G. Saracila** and M. N. Kunchur, Department of Physics and Astronomy, USC Columbia

2:30 - 2:45 PM
DEVELOPING TOOL FOR MULTI-DIMENSIONAL INTERACTION IN PHYSICS CLASSROOM ACTIVITY, **Mikhail M. Agrest,** Physics and Astronomy Department, College of Charleston

2:45 - 3:05 PM
GRANULOCYTE COLONY STIMULATING FACTOR (G-CFS) TREATMENT ALTERS BIOMECHANICAL PROPERTIES OF CRANIUM AND FEMUR IN C57BL/6 MICE, **Yii-Der Wu**[1], Chi-Hui Chien[1], Yuh J. Chao, Xiaodong Li[2] and Jack Yu[3], [1]Department of Mechanical and Electro-Mechanical Engineering, National Sun Yat-Sen University, Taiwan, [2]Department of Mechanical Engineering, USC Columbia, [3]Department of Surgery, Medical College of Georgia

3:05 - 3:25 PM
LABVIEW, Shawn Blake,Chris Carter, and James Payne, Department of biological and Physical Sciences, South Carolina State University

3:25 - 3:45 PM
USE OF A RENORMGROUP IMPROVED LOW-ENERGY EFFECTIVE POTENTIAL IN A CHIRAL-PERTURBATION-THEORY DESCRIPTION OF NEUTRAL PION PRODUCTION IN PROTON-PROTON COLLISIONS, **Ivan Danchev** and Kuniharu Kubodera, USC Columbia

3:45 - 4:05 PM
EMISSION LINE ABUNDANCES STUDY OF A LOW-REDSHIFT DAMPED LYMAN-ALPHA ABSORBING GALAXY WITH KECK LRIS, **Soheila Gharanfoli** and Varsha P. Kulkarni, Department of Physics and Astronomy, USC Columbia

FIELD BIOLOGY
ROOM: 584 CLOSE/HIPP BUILDING
PRESIDING: RICHARD STALTER, ST. JOHN'S UNIVERSITY

8:30 - 8:50 AM
MEASUREMENT OF THE ANISOTROPIC MATERIAL PROPERTIES OF CORTICAL BONE USING ASYMMETRIC INDENTATION, **Jing Lu** and Jeffrey E. Bischoff, Department of Mechanical Engineering, USC Columbia

8:50 - 9:10 AM
DETERMINING THE SETTLEMENT RATE OF ESCHERICHIA COLI IN A WATER COLUMN, **Andrea Franco** and Jack Turner, USC Upstate

9:10 - 9:30 AM
THE VASCULAR FLORA OF PUMPKINSEED ISLAND, GEORGETOWN COUNTY, SOUTH CAROLINA, **Richard Stalter**[1], A. Grigos[1], B. Kimyagarova[1], J. Baden[2] and M. Byer[3], [1]Department of Biology, St. John's University, [2]U.S. Corp of Engineers, Wilmington, North Carolina, [3]U.S. DI, NPS. Gateway National Recreation Area, Staten Island, N.Y.

9:30 - 9:45 AM Break

9:45 - 10:05 AM
TRICHLOROETHYLENE PLUME DEGRADATION PRODUCTS AND PATHWAYS WITHIN A STREAM HYPORHEIC ZONE, **John B. Williams**[1], Lashonda Williams[1], Gary Mills[1] and Noelle Garvin[2], [1]Department of Biological & Physical Sciences, South Carolina State University, [2]Savannah River Ecology Lab, University of Georgia

10:05 - 10:25 AM
SOME ECOLOGICAL OBSERVATIONS OF A MARITIME LIVE OAK FOREST AND PRIMARY DUNE COMMUNITY, DEBIDUE BEACH, SOUTH CAROLINA, **Richard Stalter**, M. Cerami, A. Grigos, N. Fahmy, E. Fahim, S. Shallalah, J. Baden and B. Kimyagarova, Department of Biology, St. John's University

10:25 - 10:45 AM
RELEVANCE OF AGE, SEX, AND ODOR ON THE FORAGING BEHAVIOR OF MANDUCA SEXTA, **Addie K. Williams** and Robert A. Raguso, Department of Biology, USC Columbia

1:30 - 1:50 PM
A PRELIMINARY STUDY OF THE VASCULAR FLORA OF VIRGINIA'S BACK BAY REGION, **Richard Stalter**, E. Lamont, S. Shallalah, S. Zargaroff, A. Jung and S. Truc, Department of Biology, St. John's University

1:50 - 2:10 PM
PEROMYSCUS GOSSYPINUS FROM POINSETT STATE PARK: MOLECULAR AND PHENOTYPIC, **Justin Reynolds**, Pearl R. Fernandes[1], Michael J. Dewey[2], [1]Division of Science, Mathematics and Engineering USC, Sumter, [2]Department of Biological Sciences, USC Columbia

POSTER PRESENTATIONS:
8:30 – 10:30 AM
CLOSE/HIPP LOWER LOBBY
PRESIDING: MICHAEL MYRICK, USC COLUMBIA

PRESENTERS ARE REQUIRED TO BE AT THEIR POSTER STATIONS.

01 MYOFIBRIL ASSEMBLY AND ELASTICITY IN DROSOPHILA FLIGHT MUSCLES, Danielle Adler, William Hartley, Catherine Kramp, Artur Veloso, and **Agnes Ayme-Southgate,** Department of Biology, College of Charleston

02 OVARIAN LOCALIZATION OF FERTILITY PROTEIN SP22, **Allison M. Benoit**, Holly A. LaVoie, Cell and Developmental Biology and Anatomy, USC School of Medicine, George L. McCoy and Charles A. Blake, Biology, Chemistry and Environmental Health Science, Benedict College

03 LABVIEW, **Shawn Blake**, Chris Carter, and James Payne, Department of biological and Physical Sciences, South Carolina State University

04 QUANTITATIVE STUDIES OF CLEAN *B. SUBTILIS* SPORES BY REFLECTANCE FTIR MICROSCOPY, **Heather Brooke** and Michael Myrick, USC Columbia

05 PROBING THE MECHANISM OF DEHALOGENATION BY *C. FUMAGO,* **Michael K. Coggins** and John H. Dawson, Department of Chemistry and Biochemistry, USC Columbia

06 ALTERATIONS OF GAD PRODUCTION BY LENTIVIRUS MEDIATED GENE TRANSFER MODIFIES SEIZURE SEVERITY IN GENETICALLY EPILEPSY PRONE RATS, **S. Alisha Epps**, Donna E. Venable, James R. Coleman, Department of Psychology, USC, Carl L. Faingold, Department of Pharmacology, School of Medicine, Southern Illinois University, and Steven P. Wilson, Department of Pharmacology, Physiology, and Neuroscience, School of Medicine, USC

07 AMMONIA ABSORPTION BY A MICROPOROUS COORDINATION POLYMER, **LaKeisha Holmes** and LeRoy Peterson Jr., Chemistry Department, Francis Marion University

08 THE EFFECTS PARP-1 INHIBITORS HAVE ON THE GROWTH OF CULTURED AORTIC SMOOTH MUSCLE, **Tiffany Kemp**, Meri Gerges, Andrea Franco, Tara DiMarco, Sam Subramanian, Jessica Clark, Nick White, and Jeanne Kowalczyk, Division of Natural Sciences and Engineering, USC Upstate

09 DIABETES AND OBESITY IN THE ETIOLOGY OF CARDIOVASCULAR DISEASE: THE ROLE OF PARP-1, **Jeanne Kowalczyk**, Jessica Clark, Tara

DiMarco, Andrea Franco, Meri Gerges, Tiffany Kemp and Sam Subramanian, Division of Natural Sciences and Engineering, USC Upstate

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SOUTH CAROLINA JUNIOR ACADEMY OF SCIENCE

MEETING ABSTRACTS

THE ROLE OF THE DOWN'S SYNDROME CRITICAL REGION 1 CANDIDATE GENE IN MENTAL RETARDATION

Benjamin Holland Able
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In a study on Drosophila, Chang et al. tested for learning and memory defects due to the over-expression of nebula, a homolog of the human Down's syndrome Critical Region 1 (DSCR1) gene located on chromosome 21 (1). It was found that by over-expressing DSCR1 in Drosophila, there was a decrease in calcineurin activity, a protein that likely regulates long-term memory (2). The resulting mutant flies showed no learning, but were visibly normal and responded to stimuli (1). In this research, the DNA of human patients with mental retardation (MR) was screened for defects in the DSCR1 candidate gene via single strand conformation polymorphism analysis. This was used to detect nucleotide alterations in the DSCR1 coding regions for each of the MR samples, identifying the role of DSCR1 as a cause of mental retardation and implicating its importance in human cognition. Of the 518 DNA samples screened, nine different types of defects were found in three of the five exons, some of which were amino acid changes. One of particular importance was a Methionine to Valine amino acid change in exon 1 alternate. This alteration has not been found in the 297 normal samples screened. However, these alterations cannot be validated as mutations until more normal DNA is screened for the gene, identifying which alterations are polymorphisms and which are mutations that could play a role in defective human cognition. From this data, functional assays could be performed to study the role of the DSCR1 protein within the human cell.

MORPHOLOGICAL ASSESSMENT OF AN ANIMAL MODEL OF PARKINSON'S DISEASE

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1-Methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) is a neurotoxin that specifically targets the neurotransmitter dopamine, which is prevalent in the nigrostriatal pathway in the brain. The main function of dopamine is to control motor movements. Intraperitoneal injection of MPTP results in loss of dopamine in the substantia nigra (SN) due to cell death, thereby limiting the amount of this neurotransmitter transported to the striatum. The aim of the present study was to determine the morphological changes that take place in the brain tissue of MPTP treated mice using immunohistochemistry. This was accomplished by calculating the densitometry of the striatum, stereological cell counts of the SN, and morphometric analysis of the neurons and nuclei in the SN of MPTP-injected mice (treatment) and saline-injected mice (control). Densitometry revealed that the MPTP and control tissue sections had very similar fiber density in the striatum. Unbiased stereological cell counts showed that MPTP sections contained 18% less neurons than that of the control sections. By measuring nuclear and neuronal volume, the data proved that MPTP neurons contained nuclei that had significantly higher volumes. The antigens tyrosine hydroxylase and glial fibrillary acidic protein were stained for using another technique called immunofluorescence, thereby localizing dopaminergic neurons and astroglia,

respectively. Crystal violet staining was used to stain neurons, too. By observing these two different stainings, the nuclei in the MPTP neurons had a more swollen appearance, the neurons were more diffused and dull in color, and the fibers in the striatum were also diffused and dull in color.

THE EFFECT OF BODY MOVEMENT ON CLASSROOM ACHIEVEMENT IN THE PRESENCE AND ABSENCE OF MOTIVATION

Rachel Abromaitis
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Movement is an activity involved in all aspects of life that allow a person to express themselves in many ways. This experiment was designed to determine whether there is a correlation between body movement and academic achievement in the presence and absence of motivation. The motivational source was represented by the informed quiz and the non-motivation was represented by the pop-quiz. For the pop-quiz experiment it was hypothesized that if no motivation is involved then the student's total body movements will increase and grades will decrease (Experiment A). For the informed quiz it was hypothesized that if a motivation is involved then the student's total body movements will decrease and grades will increase (Experiment B). It was also hypothesized that total body movements would decrease from the pop-quiz (before) to the informed quiz (after) (Experiment C). The method used to conduct this study required a class of 19 Algebra III CP students. Students were observed during a 101 minute class in which there body movements were recorded in an observational chart. Each student was observed 11 times throughout the class in 10-second intervals. At the end of the class, students were given a pop-quiz (no motivation). Grades on the pop-quiz were then correlated with total body movements during the class. This method was also performed for the informed quiz (motivation). A correlation was used to statistically analyze the data for experiments A and B. The graphs of both sets of data showed no significant difference between body movement in the presence or absence of a motivational source. Therefore, both experimental hypotheses for the correlations were rejected. A dependent samples t-test was used to see if a decrease in movements would occur from the pop-quiz to the informed quiz. The experimental hypothesis for experiment C was also rejected.

A BIOMECHANICAL ANALYSIS OF STANDARD ANTEGRADE, RECONSTRUCTION, AND RETROGRADE IMPLANTS IN SUBTROCHANTERIC FRACTURE FIXATION

Amanda Allen
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Subtrochanteric fractures account for 34% of all femur fractures. The purpose of this study was to examine and compare the biomechanical properties of different fracture patterns of Type IA subtrochanteric femur fractures treated with a retrograde, antegrade, and reconstruction IM nail in a synthetic femur model. These models have been validated to have consistent mechanical properties similar to actual femora and have been used in several previous studies. A 3x3 statistical design was used to evaluate the biomechanical properties of retrograde, antegrade, and reconstruction intramedullary nailing of Type IA subtrochanteric femur fractures. Thirty composite adult femurs were tested; three samples for each implant and fracture location combination, and three additional intact composite femurs to establish baseline data. Testing was conducted on a servohydraulic Instron materials testing machine and the

femurs were potted to ensure correct anatomical positioning. Testing consisted of elastic compression followed by elastic torsion to determine stiffness. Next, the stable fractures were converted to simulate an unstable fracture pattern by removing 3cm distal to the initial fracture site and undergo torsional stiffness and compression testing. Data showed that in compression there was no significant difference between the implants themselves. However the was a significant difference between the fracture site locations in the retrograde implant. In stable and unstable torsion the retrograde implant was almost three times as stiff as the reconstruction implant. In contrast, there was no significant difference between the different fractures sites in both stable and unstable torsion.

EXPRESSION AND LOCALIZATION OF SMAD PROTEIN COFACTORS DURING MURINE CARDIOGENESIS

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A form of congenital heart disease referred to as an aortico-pulmonary window, made between the aorta and pulmonary arteries, was studied at the Medical University of South Carolina. Embryonic mice were used as carriers of a pair of recessive genes that coded for the defect. Those that had the homozygous dominant genes develop a normal heart and are known as wild types while those that were homozygous recessive develop the window and are known as mutants. It has been found that Smad, a protein, is present more in the cytoplasm than in the nucleus of wild type cells. In mutants, Smad is present more in the nucleus than in the cytoplasm of the cells. It is possible that Smad can be the main cause for correct development in cells. RxRá or Vitamin A is believed to have and affect on the production of Smad and its localization in the cell so by using both Real Time Polymerase Chain Reaction and Immunohistochemistry, wild type and mutant cells were tested for the presence and location of Smad and RxRá. It was found that Smad is present more in the development of the outflow tract (pulmonary artery and aorta) than in the development of the ventricles. From this it can be seen that Smad affects the development of the heart and is important for correct function.

A COMPARISON STUDY OF FLOODPLAIN AND ADJACENT UPLAND FOREST COMMUNITIES WITHIN THE SUMTER NATIONAL FOREST.

Brittany Ashley
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The purpose of this experiment was to determine and compare the nuances of species, density, and overall importance of individual species between floodplain and adjacent upland forest communities within the Sumter National Forest by collecting data and subjecting it to mathematical manipulation. This project also enabled the creation of a precedent for data collection and interpretation of this nature. Data were collected within the Sumter National Forest. Six individual, non-overlapping circles with an area of approximately 530 square meters each were used as templates in which to collect data. All vegetation over 2.4 cm in diameter and 3m in height was listed in a species table, and its diameter at breast-height was recorded. The data were then subject to mathematical manipulation in order to produce numerical representations of the importance of each species to the floodplain or upland community. This experiment was not designed to produce a detailed catalog of the species of the floodplain and upland forest communities, but rather to establish a precedent for the collection of

data of the same nature. However, from the data gathered through this effort, a rough sketch of floodplain and upland communities was produced.

THE EFFECT OF CONJUGATED LINOLEIC ACID ON HL-60 HUMAN MYELOID LEUKEMIA AND NAMALWA NON-HODGKIN'S LYMPHOMA

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For many generations, food has always been and will continue to be a vital need for the society, functioning as a nutritional source, but today, many scientists are beginning to explore their intensive remedial capability. As more cases of cancer are increasing, it is crucial for a proper vaccine to be found. A recent study has established that conjugated linoleic acid (CLA), a non-toxic, fatty acid, which occurs naturally in beef, milk and other dairy products, is effective against the formation of certain types of cancers (The Associated Press). This project was designed to investigate the anticancer effect of CLA on human myeloid leukemia (HL-60) and non-Hodgkin's lymphoma (NAMALWA) cancer cell lines. It was hypothesized that CLA would inhibit the vitro proliferation and kill the different cancer cells in a dose dependant manner. HL-60 and NAMALWA cells were grown in the serum free nutrient broth, RPML-1640 and then transferred into 192-welled plates, with a total of eight well dishes. Then different concentrations of CLA were added into one row of ten wells, one row holding 0uM, which was the control, and another three rows containing 10uM, 50uM, and 500uM. To eliminate the possibility that CLA's effect was due to a non-specific effect of fatty acids and for helpful means of viewing the cells, there were two other controls that were added. These two controls are linoleic acid, which was acting as a negative control and cisplatin, a positive control. The same procedure used for conjugated linoleic acid was also used for both of these substances also. In all trials of experimentation, data has revealed that CLA both inhibits and kills the HL-60 and NAMALWA cells in a dose dependant manner, so the hypothesis was supported. Therefore, CLA may be an ideal chemotherapeutic agent in the treatment of early leukemia and lymphoma by safely killing isolated cancer cells before they multiply. If CLA proves to be clinically effective, dairy products could be fortified with higher concentrations of CLA to give people a non-toxic, cancer preventative agent that helps eliminate pre-cancerous cells through apoptosis.

THE EFFECT OF SQUALENE ON T-47D BREAST CANCER CELL LINES

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The Mediterranean diet is thought to reduce, or possibly prevent breast cancer, due to the high concentrations of olive oil. Although previous studies have shown that one of the chemicals in olive oil, oleic acid, is effective in killing breast cancer cells, some researchers hypothesized that a different chemical, squalene, is the real "cancer-buster" of olive oil. The experiments were designed to test the effectiveness of the chemical, squalene, on the viability of breast cancer tumors by examining its effect on cell protein levels and cell mortality rates. The hypothesis for the first experiment stated that as the concentration of squalene exposed to the cells increased, the cells' protein levels would decrease. The procedures for this experiment included culturing a 24-well plate of T-47D breast cancer cells, administering the squalene in the calculated amounts of (.1 ì g, .5 ì g, 5 ì g, 10 ì g, and 20 ì g), and conducting a protein assay. The hypothesis for the second experiment stated that as the concentration of squalene exposed to the cells

increased, so would the cell mortality rate. The procedures for this experiment included culturing 12 plates of T-47D breast cancer cells, administering the squalene in the calculated amounts (.1 ì g, .5 ì g, 5 ì g, and 10 ì g), and conducting a staining process and counting of the dead cells. Differences were observed in both experiments. The ANOVAs showed a significant difference in the protein levels and cell mortality do to the squalene; the Tukey tests showed that although the lower concentrations of squalene showed no affect on the cells, the higher concentrations of squalene did. Therefore, the hypotheses were partially supported.

THE EFFECT OF MICROBAN ON THE AMOUNT OF E. COLI PRESENT ON COUNTERTOPS

Mark Beal
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Food exposed to an infected surface could become contaminated with bacteria even in a matter of seconds, which may cause severe illness and sometimes death. The purpose of this experiment was to determine whether or not Microban had a sufficient effect in reducing the number of harmful bacteria associated with food borne illness. It was hypothesized that countertops containing Microban will not have a sufficient effect on reducing the number of bacteria on the countertop. After tile samples were placed in a beaker of nutrient broth inoculated with E. coli for 20 minutes, they were removed, allowed to dry for 7 hours, and placed into a beaker with sterile nutrient broth. The tiles were allowed to remain in the sterile broth for 24 hours and then small samples were taken from the broth to take spectrophotometric readings to determine optical density and thus the amount of bacterial growth. The amount of bacteria collected was measured using a spectrophotometer. The results were then recorded and analyzed using a T-test.

EXPRESSION OF $\alpha_2\delta$ SUBUNIT IN L-TYPE CALCIUM CHANNELS

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Voltage-activated calcium channels (VSCC) control many cellular functions that occur inside the body. VSCC are organized into several classes according to their functional properties. One important class are the L-type calcium channels that are high-voltage activated. The function of VSCCs can be modified by a variety of auxiliary subunits such as the $\alpha_2\delta$ subunit that has been shown to modify the biophysical properties of the pore forming α_1 subunit. There is relatively little known of the $\alpha_2\delta$ subunit. In this study, $\alpha_2\delta$ subunits were expressed along with α_1c and β_2a subunits in mammalian cells to further investigate the role of these subunits. The specific purpose of the project was to investigate whether the $\alpha_2\delta$ subunit would affect the inhibition of the channel by alcohol. To test this, cells were transfected with different cDNA plasmids encoding various subunits of the calcium channel. Channel activity was measured using the whole-cell patch clamp technique. Initial attempts to express L-type calcium channel subunits in HEK293 cells was not successful as transfected cells showed small and variable currents in response to depolarization. Expression of cDNAs into a different cell line, NG108, did produce robust currents that were modulated by the presence of the A2D subunit. Further work is needed to carefully study the effect of the A2D subunit on the alcohol sensitivity of L-type channels.

A STUDY OF POLYANDRY IN THE SALTMARSH SHARP-TAILED SPARROW, AMMODRAMUS CAUDACUTUS

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The Saltmarsh Sharp-Tailed Sparrow, Ammodramus caudacutus, has a unique promiscuous mating system where mating behavior resembles scramble competition polygyny. Males are nonterritorial and do not form pair bonds with females lasting any longer than copulation. Because females are scarce and often unreceptive, forced mating is common. The most successful males are those who are persistent and can find females quickly and efficiently. Studying the level of polyandry among females, or number of mates a female has per brood, can help reveal mating patterns and a better understanding of the distinctive mating behavior. A population of 368 saltmarsh sharp-tailed sparrows was genotyped at 13 polymorphic microsatellite loci. In doing so, DNA was extracted primarily with a standard phenol-chloroform-isoamyl alcohol protocol. The alleles at the 13 loci were amplified using a Polymerase Chain Reaction machine and were determined by a sequencer. Upon eliminating the known mother's maternal allele, paternal alleles were determined for offspring at two nests. These data verified that at least two males fathered young at both nests, but the exact number of males could not be determined.

ASCORBIC ACID BIOSYNTHESIS AND ANTIOXIDANT BALANCE IN BROILER CHICKENS DURING CHRONIC OXIDATIVE STRESS INDUCED BY DIETARY CORTICOSTERONE

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Broiler chickens are exposed to diverse stressors in the course of intensive production and intervention is necessary to minimize the adverse effects of stress. Supplemental ascorbic acid is used but little is known about the effect of stressors on ascorbic acid synthesis and its metabolism. Chronic oxidative stress was induced in broiler chickens (Gallus gallus domesticus) by dietary corticosterone administration to determine its effect on ascorbic acid synthesis, as measured by renal L-gulonolactone oxidase activity, as well as its effect on serum corticosterone tissue, ascorbic acid concentration, and serum total antioxidant capacity. This experiment was designed to determine if oxidative stress causes changes in ascorbic acid concentrations in certain tissues. A group of broiler chickens was placed on a corn-soy chick diet until 14 days of age, after which they were divided into two groups and fed the control diet or the experimental diet. The experimental diet contained dissolved corticosterone. The overall levels of ascorbic acid were not affected, but the levels of tissue ascorbic acid, as well as the body weights of the birds administered the experimental diet decreased. The failure of the L-gulunolactone oxidase activity to show any change in the metabolic process may be attributed to incomplete absorption of the corticosterone or the stress levels being within those tolerable by the birds. Any changes in the amounts of ascorbic acid were measured indirectly by means of the L-gulonolactone assay, which measured its enzymatic activity in the biosynthesis of L-ascorbate. It was then possible to determine the amounts of tissue ascorbic acid and note any differences in the enzymatic process.

KINETIC ANALYSIS OF LIPID PRODUCTION BY PYTHIUM IRREGULARE

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The kinetic analysis of biomass growth and production formation of Pythium irregulare fungal species grown in modified yeast-malt extract solution was studied. In this investigation, batch shaker bath cultivations of P. irregulare were conducted at three different temperatures: 14°C, 21°C, and 28°C. Triplicate samples were pulled according to a schedule over the period of the run. Samples were filtered to obtain the biomass, and the biomass was then freeze-dried and weights recorded. To obtain the fungal lipids, the desired product of P. irregulare, solvent extraction using the method of Hara & Raden was used, and lipid weights were also recorded. From these data, biomass growth and product formation curves were constructed. The specific growth rates, ì , of P. irregulare were found from the ln(biomass growth) curves during the exponential growth phase for 14°C, 21°C, and 28°C to be, respectively, 0.3543, 0.7571, 1.1846 day^{-1}. The temperature dependence of can be described by the Arrhenius equation, $ì = Ae^{-Ea/RT}$. The parameters were determined to be: $A = 84.0 \times 10^4\ s^{-1}$ and Ea = 62.0 kJ/mol•K. Based on the product formation curves, the lipid extracted from P. irregulare was concluded to be growth-associated.

ELIMINATING LISTERIA MONOCYTOGENES IN PACKAGED, READY-TO-EAT (RTE) TURKEY BOLOGNA BY COMBINING IN-PACKAGE PASTEURIZATION WITH ANTIMICROBIAL AGENTS

Anita Chen
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Listeria monocytogenes, a significant food pathogen, contaminates food products in the intermediate steps after cooking and before packaging. Thus, ready-to-eat (RTE) foods consumed without further cooking are of particular public health concern. In recent years, many recalls of RTE poultry products were associated with Listeria contamination, having significant impact on individual companies. In-package pasteurization is an effective method to reduce the outcome of post-process contamination in RTE meat products. Surface application of various antimicrobial agents alone, as well as in combination, is gaining attention as a successful method to reduce Listeria contaminations. Nisin is an FDA approved natural antimicrobial agent that has been shown to have synergistic effect with some other antimicrobial agents and heat. Lysozyme is a natural enzyme used as a food preservative. Considering these factors, the objective of this study is to evaluate the surface application of nisin and/or lysozyme in combination with in-package pasteurization of RTE low-fat turkey bologna to eliminate Listeria monocytogenes, particularly to lower the heat resistance of the organism. The decimal-reduction times (D-values) were determined for the different antimicrobial treatments to observe whether there was a significant reduction in the heat resistance of the organism by combining antimicrobials with the heat-treatment, which would be useful in reducing the duration of pasteurization. This study indicated a trend that by combining antimicrobial agents, nisin and/or lysozyme with in-package pasteurization of RTE turkey bologna would result in lowering the heat resistance of Listeria monocytogenes, as evidenced by the reduction of D-values and z-values.

THE EFFECT OF DIFFERENT DISINFECTANTS ON STERILIZING THE BACTERIAL CONCENTRATION OF STAPHYLOCOCCUS EPIDERMIDIS ON COMPUTER KEYBOARDS

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Millions of people worldwide use computers as a part of their everyday routine. Whether it is at work, during school, or for personal use, many people think that the only dangerous thing about the computer is the internet. But what many people do not know is the fact that the keyboard that they type on is a potentially dangerous breeding ground for bacteria. This experiment was designed to research the effect of different disinfectants on sterilizing the bacterial concentration of Staphylococcus epidermidis on computer keyboards. The four different disinfectants used were Clorox, Lysol, Formula 409, and Disinfectant Keywipes. It was hypothesized that Clorox would be the most effective because it contains Clorox and the halogen chlorine. The method used to conduct the experiment required the contamination of individual keys with the bacterium Staphylococcus epidermidis. Once the bacteria had grown, sterile cotton swabs were used to swab the top of the keys. The cotton swabs were then streaked onto a corresponding agar plate using the four quadrant streak method. After incubating the agar plates, individual colonies were counted on each plate and compared with each other. The experiment showed no significant differences. An analysis of the variance (ANOVA) test at the 95% confidence interval was conducted but showed no significant difference, since the F-value was less than the critical value. Therefore, the experimental hypothesis was rejected and the null hypothesis accepted. There is not enough evidence to support that any one cleaning solution was better at disinfecting keyboards than another.

ADOLESCENT SLEEP DEPRIVATION

Christine Chong
Academic Magnet High School

Sleep is an essential part of life that is often neglected. People need sleep to perform at peak performance and to be emotionally stable. This study is a series of case studies on sleep clinic patients and a profile of adolescent sleep deprivation at the Academic Magnet High School.

Research and surveys were used to investigate this topic. Data collected suggests that many students are sleeping less than the recommended eight hours per night and want more sleep. Many students also need to see their doctor about sleep problems. Data collected on the sleep clinic patients suggests that obesity is a major factor in causing sleep apnea, a common sleep disorder.

In conclusion, sleep deprivation is a problem in school that needs to be remedied through changes in behavior. Sleep clinic patients need to follow the instructions of their doctors, which is usually to diet and exercise.

ANALYSIS OF CARIACO SEDIMENTS FOR DIFFERENTIATION OF ORGANIC AND INORGANIC PHOSPHORUS AND THE CYCLING OF PHOSPHORUS AS A MARINE NUTRIENT

Heidi Dolly Cian
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By studying sediments as they travel through the water column, one can estimate the cycle of phosphorus (P) in an aquatic environment. P that is not present in sediment form exists as dissolved P, which returns to the ocean surface to supply the organisms that first utilized and released the nutrient. Sediment collected in traps from different depths in the Cariaco basin, the test site for this research, and from different seasons is studied to see which seasons P is heavily present. Data gathered over the course of this study showed consistent blooms of activity in late May, indicating an upwelling of nutrients and an increase in activity. Analysis of the components of these particles can also differentiate between the concentrations of organic and inorganic P. This is valuable because the ratio between the two forms of P shows which type is recycled more quickly. Results showed a higher percentage of OP at anoxic (below 275 m) depths and therefore a higher percentage of IP at oxic (275 and above) waters. This is significant because it hints that since IP is recycled more quickly organisms utilizing P prefer it.

UNCERTAINTY ANALYSIS FOR INSULIN DELIVERY IN DIABETIC PATIENTS

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Type I diabetes occurs when the body does not produce any amount of insulin. Sufferers of this disease must receive insulin daily. Subcutaneous insulin pumps have been developed for Type I diabetics. These pumps put Type I diabetics at a substantial risk of falling into hypoglycemia or hyperglycemia. Hypoglycemia is when the body has less than the necessary amount of glucose in the blood stream, and hyperglycemia is when the blood stream has too much glucose. The pumps measure the blood glucose level of the patient then algorithmically release an amount of insulin into the blood stream. Problems arise because each person has different insulin sensitivity, and many other dynamic factors. These problems often send the patient into a hypoglycemic or hyperglycemic state. The proposed patient model will graphically show how different patients respond to the amount of insulin injected into their body. This system will then be used to alarm patients of when their glucose levels are to low, or to high. The problem is that the measurements are not being taken continuously. There is some time delay between the taking of the blood sample and the results from the test. Also, the blood glucose measurement devices are not accurate. Therefore there can be many cases when a patient falls below and alarm level but is not notified because of time delay, or incorrect measurements. Also, a patient can be falsely warned because of incorrect measurements. The model will be used to determine how to minimize these cases.

THE EFFECT OF THE WIDTH AND LENGTH OF A ROCKET AND THE OXIDIZER TO FUEL RATIO OF A ROCKET ON THE AMOUNT OF THRUST PRODUCED DURING TESTING

Thomas Clements
Spring Valley High School

Two different size experimental rocket motors were tested along with three different fuel to oxidizer ratios to see the effects the variables had on the amount of thrust. The widths of the motors were 2.54cm and 3.18cm and the lengths were 14.61cm, 19.69cm, and 33.02cm. The differences in length allowed for the volume of the propellant to remain constant in all motors. Eighteen motors were constructed using schedule 40 PVC pipe using the two widths and lengths and three fuel to oxidizer ratios. All motors were loaded with the melted propellant consisting of potassium nitrate, KNO_3 and sorbitol, $C_6H_{14}O_6$. After the propellant cured for two weeks the motors were prepared for testing on a static test stand. The static test stand consisted of a wooden structure enclosing two calibrated springs mounted on screws to allow for compression. The motors were then fired on the test stand and a reading of the peak thrust of each motor was recorded. The results did not support the hypothesis that the 14.61cm motor with the 60/40 fuel ratio would produce the greatest amount of thrust. The tests showed that the 14.61cm motor with the 65/35 fuel ratio produced the most thrust.

ENERGY LIFT FROM AN IONIC LIFTER DEVICE AS A FUNCTION OF THE NUMBER OF PANELS PRESENT IN AN AREA

Theodore Cole
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The purpose of the experiment was to test energy lift from an ionic lifter device as a function of the number of panels present in an area when it is placed under same environment restraints. Various numbers of designs were used to determine if a device with less or more panels had a higher outcome of total lift with ratio. It was hypothesized that applying more panels in a given area would provide the greatest lift and or strength of the whole panel.

The experiment was conducted by fitting a chamber that would provide a constant variable environment system for the project. Five numbers of ionic lifter designs were used to generate lift with high voltage DC. Every ten seconds, for five minutes, a high reading was measured (by weight or actual distance) from the ionic device attached to the chamber, using a tape measure or gram measurement. Statistical analysis of the energy output using a one-way ANOVA showed that there was significant different (95% confidence level) in the output high measurements using various designs.

THE PALEOECOLOGY OF PEAT DEPOSITS FROM THE CONGAREE NATIONAL PARK AND THEIR SIGNIFICANCE AS NATURAL KIDNEYS

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Many sediments, such as peat, are found in wetlands. In this study, peat, which is composed of preserved organic matter, was used to research wetlands as natural kidneys (purifying ground water over time). The Congaree National Park contains large areas composed of peat. In July of 2005, we studied a core sample was taken from this park. The core was embedded in paraffin and sliced with a sliding microtome to make slides representing two centimeter sections of the core. The slides were analyzed

microscopically to determine the ratios of framework to matrix (F/M) composing the sediment. Organic fragments above fifty micrometers in any dimension are considered framework, whereas organic or inorganic particles less than fifty micrometers in size are considered matrix. The F/M ratios ranged from 0/100 to 14/86. Levels containing more framework had conditions that helped preserve the organic material, while levels containing more matrix had conditions that caused the organic materials to decompose. The final percentages gave an indication of the paleoecology of the area as well as the permeability of the deposit, which relates to the flow of contaminants through it. Loss on ignition was performed on the same core samples to determine the amount of organic matter present in samples at different depths. As a whole, the upper portions of the core contained more organic matter (42-94%), while the lower portions contained less (13-57%). The greater the organic matter, the more potential of the deposit to extract hazardous wastes from ground water.

RACIAL DISPARITIES AND CO-MORBIDITIES IN SICKLE CELL DISEASE

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Sickle cell disease (SCD) is a recessive disease that causes red blood cells to sickle in the shape of crescent moons and create blood clots. This disease typically affects African-Americans and other largely emigrated populations, mainly on the African sub-continent. The various complications of SCD can sometimes cause the appearance of certain co-morbidities because sickle cell's complications are another disease's symptoms. Our objective was to find the correlations between SCD and certain co-morbidities. The diseases used in our observation, in order of prevalence, were pulmonary hypertension, end-stage renal disease, stroke, and diabetes. Pulmonary hypertension greatly affects a number of SCD patients because the blood clotting often associated with SCD causes an increased level of blood pressure in the pulmonary arteries. End-stage renal disease is also seen in SCD sufferers because of the affect of oxygen deficiency on the kidneys. The lack of oxygen stored in the sickled cells allows for renal failure to develop in the kidneys and ultimately kill the patient. Stroke is a side effect of SCD, being one of the signifiers of an approaching pain episode. Diabetes is extremely rare in SCD sufferers, but it was found that Nigerian diabetics that were carriers for the sickle cell trait were likely to develop hypertension. The goal of our research was to create a foundation on which SCD observation could be conducted by producing a meta-analysis that takes into account problems with SCD other than its own complications.

VETERINARY ACUPUNCTURE FOR THE LOWER BACK PAIN

Sarah Covington
Academic Magnet High School

My thesis is on the veterinary acupuncture of the lower back pain in canines. I wanted to find how the acupuncture helped to heal the lower back pain and what it actually does for/to the body. I wanted to understand the process. Before I did this though, I had to find out about holistic medicine in general, the history, about the procedure, and the needles. This is all discussed in the Literature Review.
The Literature Review of the paper discusses the background of holistic medicine and acupuncture. The literature review covers different types of acupuncture, the different rules and phases of acupuncture, different Chinese theories, the effects and limits of acupuncture, types of joint problems within the dogs body, how to design acupuncture

formula, and finally the lower back pain acupuncture itself, discussing the different types of lower back pain, what needles are used, how many needles are used, and how often the treatment is needed.
For the project itself, I evaluated the clinical responses and the outcome of the low back pain. This was done by coming in and shadowing my mentor, Dr. Cone, every Wednesday. I gathered the information on what acupoints were used, the pulse, and tongue color and put it in a table. I also conducted a small survey to see what the caregivers themselves thought.
I learned where each point was on the patient and thus where the needle was inserted. The outcome of the treatment was based on the degree of improvement noted by the caregiver via improved flexibility, perception of pain, range of motion, and mental attitude.

MAXIMIZING OIL PRODUCTION BY PYTHIUM IRREGULARE USING RESPONSE SURFACE METHODOLOGY

Camille English Cox
South Carolina Governor's School for Science and Mathematics

Response Surface Methodology (RSM) is a statistical method that can be used to solve multivariate equations. This process limits the amount of samples needed for an accurate test while still allowing the behavior of a system to be thoroughly understood. RSM was used to maximize oil production by Pythium irregulare. The fungus was grown in submerged culture fermentations where the substrate was glucose. The oil production conditions were based on temperature and glucose concentrations, where the sample temperatures were 14, 21, and 28°C and the sample glucose concentrations were 5, 10, and 15 g/L. Hexane and isopropanol (3:2 v:v) were used to extract oil from the P. irregulare samples. Using SAS® statistical software, the first order polynomial model was determined for oil production with temperature and glucose concentration as independent variables. The end result for this project was the better understanding of necessary fermentation conditions for maximum oil production by P. irregulare.

THE EFFECT OF ANANDAMIDE ON THE FEEDING PREFERENCE OF UNIONOIDA UNIONDAE (GARDEN SLUG)

Jessica Crawford
Spring Valley High School

Anandamide, arachidonoylethanolamine (AEA), is a cannabinoid neurotransmitter that naturally occurs in the brain as well as other organs of animals. Allium vineale(garlic) has been shown to inhibit the health of unionoida uniondae and possibly cause death. It has been shown that anandamide increases the brain's production of natural endorphins. In the presense of foreign endorphins the brain lowers it's production of endogenous endorphins, this leaves the brain in a pain-vulnerable state, as the removal of foreign endorpins is not accompanied by the immediate increase of endogenous endorphin production. The purpose of this resarch is to determine if the presence of anadamide will cause the Unionoida uniondae to behave in ways that they would normally find dangerous or repulsive. Specifically, if the garden slugs will eat the unpreferred food which will contain allium vineale to simply obtain the endorphin-producing anadamide. It is hypothesized that when anandamide is put into the repulsive (containing allium vineale), the Unioniuda unoida will still prefer this food over the naturally preferred food not containing the anandamide. All of the slugs will be given injections of anadamide prior to experimentation. In the duration of the experimentation

the slugs will be given the choice to consume either the lettuce treated with anadamide, lettuce treated with allium vineale or plain lettuce. The amount of food placed in each terrarium is in respects to the average weight of slug mass, 10 grams per slug per day.

MINIATURE EMBEDDED MICROSTRIP PATCH ANTENNA FOR MOBILE GPS APPLICATION

Seth R. Crouch
South Carolina Governor's School for Science and Mathematics

A right-hand circularly polarized (RHCP) microstrip patch antenna was proposed for integration with mobile phones in order to meet the FCC's (Federal Communications Commission's) requirement that all mobile phones and wireless PDA's have the ability to be located by GPS (Global Position System) when a 911 call was placed. The challenge was to embed an antenna within the small volume of a mobile phone as well as to obtain 10 MHz of VSWR (2:1) and axial ratio (3 dB) bandwidth. Parameters tested include length and width of the patch, height and dielectric constant of the substrate, feed position, and the size of the ground plane. The optimal antenna design was found to be a diagonally-fed, microstrip patch antenna with a length of 29.3 mm, width of 28.1 mm, height of 1.9 mm, dielectric constant of 10.2, feed position of 0.7, and a ground plane of size 40 mm square. It was created and tested with the computer program HFSS. The antenna occupied a small volume (it could not exceed 40 mm x 40 mm x 5 mm) and was very practical for placement inside a mobile handheld device. The antenna satisfied the bandwidth, gain, and polarization requirements.

AN INVESTIGATION OF THE AGGRESSIVE BEHAVIOR OF BEACH VITEX (VITEX ROTUNDIFOLIA)

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

Beach Vitex is an introduced species to the beaches of North and South Carolina that is disturbing the native ecosystem. This study was conducted to quantify possible allelopathy and other means of competition. To study the chemical relationships we preformed greenhouse seed germination experiments with various leachates from beach vitex on sea oats and garden vegetable seeds and also tested the effect of co-occurrence. To determine the competitive characteristics, we did quantitative studies in the field, which include light and soil properties, species composition, root biomass, sand holding ability, and fruit density. Allelopathic relations were noticed with root and soil leachates in the greenhouse, along with growth depression due to co-occurrence. In the field, it was shown that beach vitex dominated its dune (87.5% average cover) and few native species were present. Root biomass averaged twice as much for beach vitex dunes (8369 g/m3) than as control dunes (4228 g/m3). The plant produced a deep shade with an average of 90% shade over 10 sites compared to 28% shade over 3 control sites. Vitex surface soil was strongly hydrophobic in half the sites, and only 30% were not, while 80% of control dune soils were not hydrophobic. Over a three-week period vitex dunes accumulated as much sand as control dunes lost. The conclusion can be made that even though vitex is an aggressive invasive species, it fulfills its introduced purpose of building and preserving dunes.

THE EFFECT OF BRIGHT-LIGHT THERAPY AND DAWN SIMULATION THERAPY RESPECTIVELY ON THE TEENAGE SLEEP-WAKE CYCLE

James Cunningham
Spring Valley High School

The study tested the effectiveness of bright-light therapy and dawn simulation therapy on the teenage sleep-wake cycle. Specifically, the use of bright-light therapy would be most effective on the ease of waking at early hours in the morning, and the use of dawn-simulation therapy would be most effective on the ease of falling asleep. A group of twenty-one students was divided into three equal groups—control, bright-light, and dawn simulation treatments. The students recorded the time in bed, time of awaking, number of hours slept, ease of falling asleep (1-5), and ease of awaking (1-5). The data was analyzed using a Chi-square Goodness of Fit Test. The tests showed that there was a preference of dawn simulation treatment in the ease of falling asleep and no preference between the treatments for the ease of awaking. The hypothesis that the use of dawn simulation therapy will be most effective on the ease of falling asleep was supported. The hypothesis that the use of bright-light therapy will be most effective on the ease of waking was not supported. The findings of these experiments are significant in that they show that the use of dawn simulation therapy does have an effect on the teenage sleep-wake cycle as presented in previous research, while bright-light therapy does not.

APPLYING DATA MINING TO ZIPF-BASED METRICS IN DETERMINING THE PLEASANTNESS OF MUSIC

Whitney R. Darby
South Carolina Governor's School for Science and Mathematics

George Kingsley Zipf (1902-1950) explored the association between mathematical measurements, or metrics, and naturally occurring events. His experiments resulted in the conclusion that the frequency of natural phenomena follows a specific equation, referred to as Zipf's Law. However, due to the lack of available technology, Zipf was forced to obtain these metrics by hand which limited his experiments. The research conducted in this project was aimed to prove that computers are capable of recognizing aesthetically pleasing music using these Zipf-based metrics. The pleasantness of the chosen music slices was first determined using averaged human responses taken on short intervals for each piece. Zipf-based metrics were then extracted from the classical pieces and transferred onto a Microsoft Excel spreadsheet. Data mining, a method of analyzing large datasets using patterns instead of calculations, was applied to the dataset in the hope of reducing the number of metrics needed for classification, thereby speeding up this process. The ultimate goal of the research is to create a Java-based program able to create aesthetically pleasing music without needing a human opinion.

THE EFFECT OF COLOR ON EMOTIONAL ASSOCIATIONS

Liane Delacruz
Spring Valley High School

Color and emotion are present in our everyday lives, so it is important that people have knowledge about both topics. There has been previous research on how color effects a person's emotions. Certain colors are said to make a person feel a specific way, and colors are commonly associated with certain emotions. The purpose of this experiment was to determine which colors people associated with positive, negative,

and neutral emotions. The experiment was also trying to determine whether or not there was one emotion most commonly associated with each color shown. In this study, happy and excited were considered to be the positive emotions, sad and angry were said to be negative emotions, while relaxed was the neutral emotion. The colors that were associated with the most favorable emotion could be placed in homes, schools, businesses, offices, and hospitals in order to make people more productive, function to their fullest extent, and be in a better mood throughout the day. It was hypothesized that if there is a higher illumination in a color, it will be associated with the more positive emotions, and the more a person likes a color, they have a higher chance of associating that particular color with more positive emotions. There were two experiments, Experiment A and Experiment B. In both experiments, subjects were required to fill out a Color Preference sheet, indicting which colors they liked the most and the least. Afterwards, the classroom was darkened and subjects viewed a variety of color slides on a television screen. The participants were asked to choose one emotion (happy, excited, sad, angry, or relaxed) to associate with each color shown. They had exactly ten seconds to view each color and write down their emotional response. Testing was done on ninth grade students at Spring Valley High School. Instead of using names, numbers were written on the surveys. The data was statistically analyzed by using the Chi-square: Goodness of Fit test and the Chi-square: Test for Independence. The emotions had an equal probability of being chosen to be associated with some colors, while there was an equal probability for the others for both experiments. For Experiment A, yellow, green, and magenta were associated with the most positive emotions, and results showed that a person's emotional associations are independent from his or her color preferences. White was associated with the highest amount of positive emotions. The results from Experiment B show evidence that the emotions people associated with the colors shown are dependent upon their color preferences.

THE ANTIMICROBIAL EFFECTS OF FOENICULUM VULGARE ON THE GROWTH OF STAPHYLOCOCCUS EPIDERMIDIS

Ashley Dent
Spring Valley High School

In the future, medicinal remedies could be used as a replacement for antibiotics. These remedies could greatly include plants that contain antimicrobial factors. This experiment was designed in order to determine if Foeniculum vulgare's antibacterial properties could serve as an alternative to antibiotic medicines. The independent variable for this research was the part of the antimicrobial plant that was used. The dependent variable was the amount of bacteria that each part killed, or inhibited the growth of. It was hypothesized that the essential oils that were contained in the seeds would have the most inhibiting effect on the growth of Staphylococcus epidermidis. The method included crushing and measuring out 1 g, 5 g, and 10 g of each part of Fennel, including the leaves, the stems, and the seeds. Then each of these measured plant parts were placed in separate Erlenmeyer flasks and inoculated with 0.25 mL of Staphylococcus epidermidis. All broth cultures were incubated for 24 hours at a temperature of 37 degrees Celsius. After incubation, ten samples of each culture were transferred to cuvettes and quantified through optical density readings using spectrophotometry. The percent transmittance of each sample were obtained and statistically analyzed. An ANOVA test at á= 0.05 revealed that there was a significant difference between one of the groups. Therefore, a Tukey test was performed in order to discover which group was more significantly different. The Tukey test revealed that

there was a significant difference between the control and each of the seeds, stems, and leaves.
However there were no significant differences between any of the three parts of the plant. Therefore, further hypothesis testing may need to be conducted in order to find out which of the parts had more inhibition of bacterial growth. Under these conditions, it is not possible to make a statement about whether the hypothesis was supported or not supported.

THE EFFECT OF VARIOUS ANTHOCYANIN DYES ON THE VOLTAGE OUTPUT OF DYE-SENSITIZED NANOCRYSTALLINE SOLAR CELLS

Rebecca J. Dillow
Spring Valley High School

Solar cells produce energy by converting light into electricity through a series of chemical processes occurring within a cell. One type, called the Nanocrystalline Dye Sensitized Solar Cell, uses anthocyanin dye, titanium dioxide, and iodide to generate a cycle of electron transfers to produce energy. Solar energy could save a lot of money to homeowners and businesses alike because it is far less costly than electrical energy. It also does not use up the limiting supply of fossil fuels. The purpose of this project was to determine whether blackberries, raspberries, or pomegranate seeds yield the highest voltage output in nanocrystalline dye-sensitized solar cells. It was hypothesized that blackberries would have the highest voltage output and that pomegranate seeds would have the lowest voltage output. The cells were made by covering a piece of tin oxide (SnO_2) coated transparent glass with titanium dioxide (TiO_2) paste and soaking it in one of three berry dyes, serving as the negative electrode. Another piece of this glass was then scratched with carbon pencil lead, serving as the positive counter-electrode. The electrodes were clipped together and iodide electrolyte was added to the side to be absorbed between them. It was placed in sunlight and voltage readings were recorded using a volt-ohm meter. Tests were conducted comparing the collected raw data to determine whether the hypothesis was supported or not supported.

HOW DO DIFFERENT MUSIC GENRES AFFECT REACTION TIME?

Daniel Fuerst
Heathwood Hall Episcopal School

Many drivers, especially younger ones, choose to listen to music while operating a vehicle. Quick decisions are constantly being made, so how does this constant music stimulus affect their reaction times? How do different genres of music affect reaction times? It was hypothesized that different types of music would directly affect how fast or slow a human would react to a stimuli. Ten individuals were given a reaction times test on special computer software, BioBytes, while listening to three different genres of music: rock, pop, and classical. The data showed that music affected each individual differently; however, when asked what their preferred genre of music was, it showed some correlation to the data collected. According to the results of the experiment, different types of music improved people's reaction times, but the genre of music that affects the individual depends on the individual's music taste.

THE MODULAR SYNTHESIS OF BIS-UREA MACROCYCLES

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

Bis-urea macrocycles are the building blocks of new porous solids and have a number of potential applications ranging from gas storage to drug delivery and membrane transport. These ring shaped compounds consist of two C-shaped spacers and two urea molecules. The urea groups of one ring can form hydrogen bonds to the urea groups of another macrocycle, about and below the rings. This bonding guides the self-assembly of these individual building blocks into cylindrical assemblies. These tube-like structures that are formed can, theoretically, be synthesized with the desired binding properties. The goal of this research was to create a new C-spacer that would lead to a new tubular structure with unique binding properties. The target molecule was1,3-di(1-propyn-3-bromo)benzene, which serves as a C-spacer. A two step synthetic pathway was used, starting with 1,3-diiodobenzene to synthesize the target molecule.

IMPACT OF ANTIMICROBIAL POTENCY DISTRIBUTIONS IN INDIVIDUAL HOSPITALS ON TARGET ATTAINMENT RATES USING MONTE CARLO ANALYSIS OF LEVOFLOXACIN AND GATIFLOXACIN AGAINST STREPTOCOCCUS PNEUMONIAE

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

A comparison of patient population success rates nationally versus rates within individual institutions has not previously been studied. Streptococcus pneumoniae isolate and treatment data were collected from 56 hospitals and 2267 patients nationwide. Monte Carlo analysis was then employed to assess the probability of attaining various target Minimum Inhibitory Concentration to Area under the Serum Concentration curve ratios (MIC:AUC). In this study, Monte Carlo simulation used simulated AUC values originating from Creatinine Clearance levels at the Medical University of South Carolina. The bacteria isolates were collected from patients with Streptococcus pneumoniae who had MIC values determined for both Levofloxacin and Gatifloxacin. Using a simulated patient population of 10,000, the probability of attaining an AUC: MIC ratio of 30 for Levofloxacin 750 mg, Levofloxacin 500 mg, and Gatifloxacin was 99.0, 95.3, and 99.4, respectively. The probability of attaining an AUC: MIC ratio of 60 for the same drugs was 86.5, 56.1, and 99.1, respectively. In the analysis of individual hospitals these target attainment rates varied widely. It can be concluded from these results that at an AUC: MIC ratio of 60 Gatifloxacin always has a higher probability of success than Levofloxacin does. It can also be concluded that simulations of this type vary widely in individual institutions from the national results, so Monte Carlo analyses in each hospital may be beneficial to large numbers of patients.

IS CASUAL-INTERFERENCE OF MEMORY EFFECTED BY AGE?

Brittany Hall
Spring Valley High School

Casual-inference error, a type of memory error, has always been a large dilemma to deal with in the courtroom. This type of memory error causes large disputes in Eye-witness cases. This experiment was designed to research the effects of age on the susceptibility to casual-inference error. It was hypothesized that not one group would be more susceptible to the formation of false memories than the other. Therefore, the

formation of memories due to casual-inference error would not differentiate between each age group. The methods used to conduct this research required four different groups of students, each group being of different grade levels. A group of fifth graders, a group of seventh graders, a group of ninth graders, and a group of eleventh graders were used to conduct the research. Each grade level watched a slide show depicting a tennis point with one slide left out. This slide illustrated the racket's contact with the tennis ball. Students then completed a simple survey pertaining to the show they watched. These students then watched the same show the next day, this time with the slide added back in. The students then completed the same survey as the one they completed in the previous day. The data was then statistically analyzed using a Chi-Square test. Significant differences were not observed between each age group. The chi-square test revealed that casual inference error and age are independent of each other. Therefore, the experimental hypothesis was retained.

SPHINGOLIPID ANALYSIS DURING MACROPHAGE:CRYPTOCOCCUS NEOFORMANS INTERACTION

Charles F. Haller
South Carolina Governor's School for Science and Mathematics

Cryptococcus neoformans is an opportunistic, fungal pathogen that enters a host through the respiratory tract. It leads to a life-threatening meningo-encephalitis in patients suffering from compromised immune systems. Increased resistance to antifungal treatments calls for an increased understanding of the infection mechanisms of C. neoformans. In our studies, we strive to better understand the sphingolipid biology that ensues after a host Alveolar Macrophage (AM) is infected by C. neoformans cells. Previous studies demonstrated that up regulation of Inositol-phosphoryl ceramide synthase 1 (Ipc1), a sphingolipid structure found in the fungal cells, resulted in an increased size of the phagolysosomes encapsulating C. neoformans cells within the AMs. This may indicate a transfer of sphingolipids from the pathogen to the host or vice versa. In the present study, LCL-186, a fluorescent marker, was used to determine whether Ipc1 and/or sphingomyelin, the AMs equivalent to Ipc1, are transferred between host and pathogen during co-incubation. Findings provide new incite into the sphingolipid metabolisms of both the AMs and C. neoformans during interaction.

THE EFFECT OF THREE DIFFERENT 5-10-31 FERTILIZER CONCENTRATIONS ON THE SURVIVAL RATE ON DAPHNIA MAGNA

Sean Hastings
Spring Valley High School

The issue of chemical runoff from golf courses has long been known as an increasing relevant environmental problem. This experiment was designed to test the effects of 1.525g, 3.052g, and 6.105g of 5-10-31 fertilizer on Daphnia magna, mortality. The variable changed in this experiment was the amount of fertilizer placed into the Petri dishes along with the Daphnia magna. The application rates were utilized as a model simulation of golf course runoff. The hypothesis was that the Daphnia exposed to the higher amount of fertilizer would have lower survival rates than that of those exposed to the lower levels. This test was complete by placing ten Daphnia into a full Petri dish along with the fertilizer, and counting the amount living after the 5 minute test period. It was found that the Daphnia exposed to the higher amount of fertilizer were killed faster than those exposed to the lesser amounts of fertilizer. The control showed that in normal conditions all the Daphnia survived, but when exposed to increasingly greater

amounts of fertilizer, the survival rates gradually went down. Results were statistically tested with an ANOVA; the F value came out to be 7.58, which are greater than 4.50, with the degrees of freedom being 4 and the level of significance being .05. Therefore, the null hypothesis of their being no significant difference between fertilizer amount and survival rate was rejected. Overall the testing was completed successfully, yielding valid, insightful findings.

USING GOLD NANORODS AS AN OPTICAL PROTEIN SENSOR

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

Gold nanorods have special optical properties. Biotin-modified nanorods can be linked together end-to-end in the presence of biotin-binding protein, such as streptavidin or neutravidin. For aspect ratio 4 nanorods, both transverse and longitudinal plasmon bands are in the visible wavelength region. This end-to-end linkage of nanorods caused a red-shift in the longitudinal plasmon band of the gold nanorods. Increasing absorbance at 1100 nm which was used to monitor protein concentration from 3-30 μg/mL. The assembly of nanorods was also characterized by transmission electron microscopy (TEM) where end-to-end linked nanorods are readily observed. This linkage can be used to detect the amount of protein in a solution.

OPTIMAL CONFIGURATION OF PHOTOVOLTAIC ARRAYS FOR MOBILE APPLICATIONS

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

Flexible solar cells have been developed that can be used in mobile applications for small electronics. These thin, flexible cells have been used on jackets and bags and can be used to charge batteries or power mp3 players, among other equipment. Due to their small size, these photovoltaic arrays produce small amounts of power. Currently the cells in these photovoltaic arrays are wired typically in series so that the voltage produced is large enough to power the device. This project used the Virtual Test Bed simulation software developed by The University of South Carolina to simulate three different situations. The first simulation included a number of individual cells in series, with every four cells bypassed by a diode. The second simulation contained the same number of cells wired in series, with every single cell bypassed by a diode. A parallel configuration was also made that contained the same number of cells. The maximum power point for each configuration was found. The parallel configuration produced more power than both series configurations in all fifteen trials. On average, the difference was 95% greater, showing promise for many applications.

OBSERVING SHORT TERM CHANGES IN THE BRIGHTNESS OF VARIABLE STARS AE AQUARII, KR AURIGAE, PX ANDROMEDA, UX URSAE MAJORIS, MV LYRAE, V1159, AND FS AURIGAE

John Hodge
Spring Valley High School

This study was designed to observe short term changes in the brightness of cataclysmic variable stars. The objective was to hypothesize the causes of short term brightness changes in variable stars. Cataclysmic variable stars are binary star systems with one white dwarf star and one normal star that orbit each other at rapid rates. A cataclysmic

variable system experiences repeated eruptive outbursts that increase their apparent brightness by short periods of time. The purpose of this study was to understand the dynamics of cataclysmic variable stars. The study utilized a ST-7 CCD camera and a 12-inch telescope and imaged over a thousand images of 7 seven different suspected cataclysmic variable stars. The suspected variable stars tested were AE Aquarii, KR Aurigae, PX Andromeda, UX Ursae Majoris, MV Lyrae, V1159, and Fs Aurigae. A statistical F-test at α=0.05 was run to calculate if there was enough variance to show that stars are variables. The results show that there was enough confidence to conclude that all observed stars except V1159 were variables. The study also compared these light curves to light curves of known variables to determine the classification from the shape of the light curve. It was found that KR Aurgae is a Z Camelopardalis type variable star, Px Andromeda has characteristics of a Sw Sextantis cataclysmic variable, FS Aurigae does not seem to fit into current classification, and appears to be an inverted version of an intrinsic eruptive nova like cataclysmic variable.

ONLINE GUI FOR CONTRASTING MATERIAL MODELS OF SOFT TISSUE BEHAVIOR

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

The mechanical properties of soft tissue are important during normal in vivo functioning. These properties can be measured using a range of testing procedures; the resulting data are the basis for numerous competing constitutive models that have been proposed by researchers and which are used to predict the tissue response to other modes of deformation. Currently there is no effective way for researchers to contrast the ability of different models, some of which are analytically complex, to fit new data sets.

The goal of this project was to create a tool used by researchers to calculate the response of various models to basic modes of deformation (uniaxial and biaxial deformation), in order to assess efficiently the applicability of each model to a given data set. The two researched were a tendon model developed by Puso and Weiss and myocardium developed by Humphrey et al. To make this tool user friendly, a series of Graphical User Interfaces were created inside java applets. These applets, which are the center of the web pages in which they are contained, were constructed so as to accept input values from the user for model specific material parameters and parameters relevant to the particular mode of deformation (e.g. minimum and maximum stretch). Using these values, the applet calculated the prediction from the selected model, and created a graph that shows the general trend of the model. These results may be used for generating raw calculated values or determining which model is most appropriate for a particular data set.

THE EFFECT OF AGE, RACE, SEX, LEVEL OF PHYSICAL ACTIVITY, AND DIET ON BONE DENSITY LEVELS

Melissa Ikerd
Spring Valley High School

The purpose of this project was to determine the effects of age, race, sex, level of physical activity, and diet on bone density levels. Bone density is a measure of the bone's strength. It is expressed in grams of mineral per volume. In this project the machine used to determine the bone density levels was the Ultrasound Heel Scan. It sends a small wave of electricity through the bottom of the foot. The machine calculates how

much electricity is absorbed by the bone and then gives a reading of the bone density level. With the reading of one's bone density level, one can take proper steps to prevent Osteoporosis from occurring. It was predicted that the older the subject, the lower bone density level. Also, it was predicted that women would have lower bone density levels than men and that Caucasians would have lower bone density levels than African Americans. Subjects who exercise regularly would have a higher bone density level than the subjects who do not exercise regularly and subjects who have a healthy diet will have higher bone density levels than the subjects who do not eat healthy.

ANALYSIS OF ENVIRONMENTAL QUALITY AND PRODUCTION EFFICIENCY IN HIGH- AND LOW-DENSITY AQUACULTURE OF LITOPENAEUS VANNAMEI

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

Because most of the world's natural seafood supply is diminishing, new methods of aquaculture, the raising of aquatic species for the consumer market, are being developed to meet the growing demand. One way to meet this demand is through high-density aquaculture of Litopenaeus vannamei, the Pacific white shrimp. To test the effectiveness of the high-density method, two ponds of differing shrimp densities were monitored for fourteen environmental indicators including ammonia, nitrite, nitrate, and alkalinity levels; dissolved oxygen levels; number of microbes in water samples; and biochemical oxygen demand. The results of regular monitoring were analyzed statistically with a one-way analysis of variance (ANOVA) to determine if the separate components contributing to environmental health differed between the two ponds. It was found that the only reading with significant difference was afternoon pH levels, which most likely is due to overfeeding f the shrimp. It was then concluded that while the most economically feasible option in terms of risks and costs is a low-density (preferably indoor) pond, the environment of the two ponds remains relatively stable and both are suitable for shrimp farming.

THE EFFECTS OF COGNITIVE INTEREST ON BLINKING

Joseph Kamassai
Spring Valley High School

The purpose of the experiment was to test the effect of cognitive interest on blinking. Seventeen student volunteers were recruited and human consent forms were obtained to gain consent. Prior to experimentation, subjects were given a survey identifying what foreign languages they could speak and/or understand. The survey also allowed the subjects to identify two movies from a long list of approximately 100 movies that they deemed to be interesting. Each subject viewed two separate video clips per trial for two trials while being recorded on a video camera in order to later determine the number of blinks each person makes per trial. The first video clip was a selected clip such as a news broadcast or a soap opera in a foreign language that the subject could not understand. This clip was meant to be uninteresting. The other video clip was a segment from one of the movies that the subject selected in the survey. This served as the interesting clip. It was hypothesized hat increased interest would result in less blinks. The risk for these experiments was essentially none. Once all of the data was acquired, the number of blinks per trail was averaged together for the interesting clips and for the uninteresting clips. An independent samples t-test was used to compare the mean number of blinks recorded for the interesting and uninteresting video clips. The null hypothesis was rejected with $t(32) = -3.02$, $p < 0.05$. It was therefore concluded

that there was a significant difference between the average numbers of blinks recorded for the interesting video clips versus the number of blinks recorded for the uninteresting video clips. The mean number of blinks recorded for subjects viewing the interesting video clip (11.65) was significantly less than the number of blinks recorded for subjects viewing the uninteresting clip (19.09); therefore, the hypothesis was supported.

TRIBLOCK COPOLYMER SOLVENT INTERACTION

Brandon Kempf
South Carolina Governor's for Science and Mathematics

The possibility of reversible nature in the solvent interaction between the solvents, Toluene and Ethyl Acetate, and the cross-linked polymer structures was investigated, along with determinations of inner structure morphology of the cross-linked and swollen poly[styrene-b-(ethylene-co-butylene)-b-styrene] (SEBS) thin films. It was predicted that the SEBS polymer was reversible between the Toluene and Ethyl Acetate solvents. To test this, the SEBS was grafted to a substrate and dipped between the two polymers, while changing different variables. It was found that the SEBS polymer although somewhat reversible, was not. Future work can be found in the testing of more solvents and the testing of the SEBS polymer's mechanical properties which will allow characterization of the structure.

ACCELERATION OF TRAINING AND EXECUTION TIMES OF A KOHONEN-BACKPROPAGATION DUAL NEURAL NETWORK SYSTEM FOR FACIAL RECOGNITION USING DISTRIBUTED PROCESSING

Asif R. Khan
Spring Valley High School

The purpose of this research was to develop and program an algorithm for facial recognition using a combination of a Kohonen and back-propagation neural network in conjunction with a distributed computing system to improve time efficiency. The algorithm was as follows: High dimensional facial image input was mapped into a lower dimensional vector space by a Kohonen network. This lower dimensional vector space was then used as the input to the back-propagation classifier network, which learned to associate images with corresponding individuals. The entire training process was distributed across multiple PCs to allow for faster training times, using a workload distribution algorithm designed by the researcher specifically for this application. After initial testing in the residence of the researcher, the algorithm was tested at a computer lab with approximately 30 computers. As a control, the algorithm was also tested on a single-processor system for comparison. The dependent varibles tested for were the training time, execution time, and accuracy of the algorithm. Dependent samples t-tests (á=0.05) were used to compare the 30-processor environment with the control. It was hypothesized that by increasing the number of processors, the training and execution times would significantly decrease, whereas the accuracy would remain statistically equal. Possible future research could be carried out to further improve the efficiency of the algorithm.

THE EFFECT OF AN ELECTROMAGNETIC FIELD ON THE GROWTH OF STAPHYLOCOCCUS EPIDERMIDIS

Jay Kornder
Spring Valley High School

Technology has seen major advancements in the past century. This includes a rise in the amounts of electrical devices used by many people all over the world. From televisions to computers, lights to radios, technology has touched the lives of everyone. Not only has it touched the lives of people, it has also influenced some organisms which existed long before the microwave and prime time television. This experiment was performed to help in understanding how some of these new inventions affect some of these organisms. More precisely, this study is on the effect of an electromagnetic field on the growth of bacteria, Staphylococcus epidermidis. It was hypothesized that the electromagnetic field would have derogatory effects on the bacteria, slowing growth when compared to the control. This hypothesis was tested by growing two sets of 34 inoculated test tubes. One was placed around an electromagnetic coil with a magnetic field strength of 2 gauss. Another was placed away from the magetic field. Both were then grown for 48 hours and spectrophotometry readings were taken at 0, 24, and 48 hours. After testing was finished, the conclusion was reached that there was no statistical difference between the control and experimental groups. Therefore, the experimental hypothesis was rejected.

THE DEVELOPMENT OF CLINICAL ASSAY FOR THE PRESENCE OF THE SURVIVIN PROTEIN TO DIAGNOSE AND MONITOR BLADDER CANCER

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Bladder cancer affects thousands of people every year. Approximately five thousand people die from the disease every year, while over twice as many are diagnosed with it. Due to the current treatment of the cancer, almost three-fourths of the patients will relapse. The tests for monitoring it also leave much to be desired—in specificity, sensitivity, labor intensity, and invasiveness. Preliminary studies performed by Watson et al suggest that an indirect test for the presence of the Survivin protein, not DNA, in urine, could potentially become a more popular test to detect the cancer. To test this hypothesis, the methods and materials for the technique were optimized, and then these optimizations were used on patient samples obtained from clinics in the Charleston area. The results obtained were then compared with the current methods for detecting the disease. This comparison showed that the Survivin test, with more work, could eventally replace the current methods, and possibly even reveal the progression of the cancer.

DO CANOPY TYPE AND LAND USE AFFECT LOBLOLLY PINE (PINUS TAEDA) MYCORRHIZAE?

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Mycorrhizae are a symbiotic association between a fungus and a plant, helping loblolly pines (Pinus taeda) to grow. In this experiment, 80 nursery seedlings were planted and 40 natural seedlings were collected to study the diversity and abundance of mycorrhizae in different land use and canopy areas. The roots were observed with a dissecting microscope and the characteristics of the mycorrhizae were recorded. For

the natural seedlings, land use and land use-canopy interaction for abundance of mycorrhizae were significant. There was no significance in any category for diversity. Only six of the 80 nursery seedlings survived and there was no significance for abundance or diversity. The most common species found on the natural seedlings were Suillus collinitus, Pinirhiza spinulosa, and Pinirhiza echinata. For the nursery seedlings, Pinirhiza echinata and Quercirhiza nodulosomorpha were most common.

THE EFFECT OF AGE ON THE PREFERENCE O VARIOUS GRAPHICAL ASPECTS OF A WEBSITE

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Because preferences change as age increases, marketers today struggle to create websites that are perfect for a certain age group. A website's layout helps a user make a choice. Most important is the layout's color, which can be broken down into hue, saturation, and brightness. It was predicted that an increase in age would cause a decrease in preference for warm hues, high saturations, and high brightnesses. Contrast is also important because colors rarely come alone. It was predicted that preference for high contrast would remain the same at all age groups. Of four font styles, it was hypothesized that an increase in age would mean an increase in preference for standard as opposed to strange fonts. It was also hypothesized that preference for a graphical page entry and high interactivity would decrease with an increase in age. Subjects were seated at a computer and asked to rank websites with subtle changes applied. Chi-square tests were conducted on the resulting data, and it as concluded that although there is a high preference for cool colors, higher saturations, higher brightnesses, higher contrasts, and standard fonts, it does not vary tremendously from one age to another. Children were found to prefer a graphical page entry and a higher interactivity more than both adolescents and adults. A balanced style much be reached to accommodate for all either all age groups or a single one.

THE EFFECT OF VARIOUS TYPES OF HONEY ON THE GROWTH OF STAPHYLOCOCCUS AUREUS

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Skin infections caused by Staphylococcus aureus are a common problem in hospitals among very young children and the elderly (CDC, 2003). Many antioxidants are used to treat illnesses and diseases, such as wound infections, burns, and the common cold. The purpose of this research is to determine how various honeys (basswood, blueberry, buckwheat, sage) affect the growth of Staphylococcus aureus. In an earlier study a correlation was found showing that dark honeys had higher levels of ascorbic acid, which is a strong antioxidant (National Honey Board). It was hypothesized that buckwheat honey will have highest optical density reading. Each type of honey will be tested to determine their effectiveness and distilled water will be used as a control. Broth will be inoculated with S. aureus in several test tubes. Solutions will be made by mixing the various types of honey in warm distilled water. Then, the broth containing the Staphylococcus aureus will be added to each of the hoey solutions in cuvettes. The solutions containing the honey and bacteria will then be incubated at 37ºC for 24 hours. After the 24-hour period, optical density readings will be taken for each trial using a spectrophotometer. An ANOVA test will also be conducted to determine if there is a significant difference in the optical density readings for each type of honey at the á=0.05 level.

IDENTIFICATION OF GENES IN TRYPANOSOMA BRUCEI THAT MAY BE INVOLVED IN RNA INTERFERENCE

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Trypanosoma brucei is an ancient parasitic protozoan that is the causative agent of African Trypanosomaisis. RNA Interference (RNAi) is a conserved eukaryotic response to double stranded RNA (dsRNA) that results in the specific degradation of homologous mRNA. RNAi has proven to be a powerful tool for forward and reverse genetics in T. brucei. This research focused on the use of T. brucei to identify proteins that may be involved in RNAi. A Histone Acetyltransferase (TbHAT) that may be a repressor of RNAi in the African trypanosome was identified from a genome-wide screen. To determine how this gene may be involved in RNAi, a single allele knockout of TbHAT was generated. The knockout was then transfected into the 29-13 T. brucei cell line. With the TbHAT single allele knockouts in the trypanosomes, the ability of the cells to do RNAi will be monitored.

THE EFFECTS OF THE TISSUE INHIBITOR OF METALLOPROTEINASES-1 TRANSGENE INSERTION ON THE ELECTOCARDIOGRAM FOLLOWING MYOCARDIAL INFARCTION

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The Tissue Inhibitor of Metalloproteinases-1 (TIMP-1) is an endogenous 28 kDa prtoein with multifaceted roles with respect to tissue growth and remodeling. Therefore, it is likely that changes in TIMP-1 protein levels which occur in physiologic and/or pathologic conditions are due to transcription of the TIMP-1 gene and resultant production of messenger ribonucleic acid (mRNA). A common model used for testing TIMP-1 levels following a pathophysiologic stimuli is the trangenic mouse. However, it is unknown to what extent insertion of the TIMP-1 transgene will have on cardiac function following a pathophysiologic stimulus. To test effects of insertion, an occlusionary stitch was placed on the left anterior descending coronary arteries of TIMP-1 trangenic mice (n=22) and wild-type mice (n=9), allowing myocardial infarction (MI) to occur in the left ventricle (LV). Following MI, electrocardiograms (ECGs) were taken in lead I conformation to asses electrical activation of the chambers. After statistical analysis, only the PR interval at three days post MI exhibited difference from the wild type mice, indicating an elongated atrioventricular nodal delay in that unique instance. Such a statistical difference was attributed to low sample size of the wild-type mice. Furthermore, the TIMP-1 transgenic model can be used as a means of studying TIMP-1 gene expression following physiologic and/or pathophysiologic stimuli.

THE EFFECTS OF HYALURONAN OLIGOMERS ON GLIOMA INVASIVENESS IN THE RAT SPINAL CORD

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Gliomas are tumors that infiltrate the brain with finger-like projections, making them difficult to isolate. With no effective way to completely remove infiltrative gliomas, scientists are attempting to therapeutically target these tumors on a molecular level. Hyaluronan (HA) is a polysaccharide overproduced in glioma cells that binds to cell-surface receptor CD44, which interacts with receptor tyrosine kinases (RTKs) such as

ErbB2. This interaction triggers a signaling cascade that results in downstream pathways of invasiveness, drug resistance, and anti-apoptosis.The purpose of this investigation is to ascertain the effectiveness of HA oligomers in reducing glioma growth. The small HA oligomers bind to cell surface receptors, preventing the endogenous long form of hyaluronan from binding to CD44 and activating downstream pathways. It was hypothesized that injection of HA oligomers into C6/lac-Z rat glioma tumors in the rat spinalcord would prevent this endogenous HA/CD44 interaction, thereby inhibiting specific RTKs' activation of pathways that result in cancer progression. C6/lac-Z cells were cultured in a hood and injected into the spinal cord of Sprague Dawley rats (n=6) at the T9/T10 level using an electromotive micromanipulator and stereotaxic equipment. HA oligomers injected after seven days in two rats resulted in appreciable reduction of glioma growth, as shown by results from immunohistochemical stains. These initial results suggest HA oligomers can be used to downregulate anti-apoptotic pathways and reduce glioma growth. The potential use of oligomers as a therapy for glioma patients is a long-term benefit of this research.

THE EFFECT OF STRAIGHT, REARWARD SWEPT, AND DELTA WINGS ON LIFT, SPEED, TOTAL DISTANCE FLOWN, AND TOTAL TIME FLOWN.

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Aircraft are very useful in today's society. They provide fast transportation, security, and are very common in rescue service. One of the most important parts of an aircraft are wings. This experiment was conducted to determine the effects of three different wing styles, straight, rearward swept, and delta, on lift, average speed, distance, and total time flown at low speeds and low altitudes. It was originally hypothesized that the straight wing style would fly the furthest, longest, and highest. It was also hypothesized that the sweep wing would have the fastest average speed. The method used to conduct the experiment was to design models with the same wing area and the same mass were designed. The Models were launched using springs and a force of five Newtons. The distance, time, and altitude flown were recorded and the average velocity determined. The results were statistically analyzed using an ANOVA, and the differences between were determined using Tukey tests. Significant differences were found in all four variables. The straight wing was the most efficient at the total distance and speed flown, and the sweep wing was most efficient at producing lift ($p=0.05$). The only significant difference found between the aircraft in the result of total time flown as between the sweep and delta, and the straight and delta wings. The experimental hypothesis, excluding the hypothesis that the straight wing would fly the furthest, were rejected.

THE EFFECT OF HEIGHT AND LEG LENGTH ON THE STRIDE LENGTH OF A RUNNER

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Running is a common sport, whether it is for enjoyment, to stay in shape, or to compete. Whatever the reason, runners usually want to improve their mileage time. Runners may be aware of factors that impact their time, such as stride length. Though practice is needed to obtain a greater stride length, stride length is mostly pre-determined by your body structure. This experiment was designed to determine the relationship between leg length, height, and stride length. It was hypothesized that there was a correlation between the leg length, height, and stride length. Sixteen female runners

were videotaped while running 400 meters around a standard track. Participants were also measured for their height and leg length. To determine if there was a relationship between leg length, height, and stride length, a correlation and regression test was used. The correlation test used on the stride length and leg length showed an r-value of 0.266; this shows a correlation between the leg lengt and stride length. Another correlation test was used on the stride length and height which gave an r-value of .0347; this also shows a correlation between stride length and height. Therefore, the experimental hypotheses of the experiment were accepted.

THE PHYTOREMEDIATION OF CHROMIUM-CONTAMINATED WATER BY NYMPHOIDES INDICA

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Phytoremediation is a pollution removal technique that has many possibilities. This experiment was designed to determine the ability of Nymphoides indica in the removal of chromium from water at different initial concentrations, measured in parts per million (ppm). There were 5 levels for the independent variable: 0ppm (control), 1ppm, 5ppm, 10ppm, and 15ppm were the initial concentrations. It was hypothesized that Nymphoides indica would be able to remove the chromium and that there would be a significant difference in the amount of chromium before and after the plants were added. In the study chromium was added tanks of water to reach the 5 different initial concentrations (0ppm [control], 1ppm, 5ppm, 10ppm, and 15ppm). The initial concentrations of chromium in each tank were taken using spectrophotometry. Then, Nymphoides indica were placed in the tanks (one plant per tank), and the plants were left in the water for a period of 14 days. Four trials (four plants) were completed or each initial concentration. After the specified time period, a sample was taken from each tank and the final concentrations of chromium were measured using spectrophotometry. Nymphoides indica were found to be fairly effective in the removal of chromium, averaging 56.88% of chromium removed for all plants. A dependent samples t-test was used to determine if there was a significant difference in the amounts of chromium. It was found that there was a significant difference in the concentrations of chromium before and after Nymphoides indica were added, therefore the hypothesis was supported.

THE EFFECT OF COMBINING SACRIFICE METALS TO PAINT ON THE CORROSION OF STEEL

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Corrosion is one of the most common and costly chemical processes that occurs in many different metal structures. This electrochemical process causes the wearing away of the metal surfaces, much like erosion because of the gradual deterioration of a material due to reactions in the environment. A structure is often protected against corrosion by the adding of sacrifice metals, which are metals that oxidize or corrode instead of the underlying material. Sacrifice metals are commonly added to a structure by the application of a hot liquid coating of the metal, or by using paint containing sacrifice metals. This experiment was designed to research the most effective sacrifice metal, while mixed with paint, at protecting steel rebar from corrosion. The five sacrifice metals that were tested were Iron, aluminum, zinc, magnesium, and lead; all used in a powdered form. It was hypothesized that zinc would provide the best protection from

corrosion because zinc is already used in an effetive method of protecting structures, called galvanizing. The method used to conduct the experiment was first the combining of powdered metals to paint and the painting of steel rebars. Electric current was then sent through each bar to speed up the oxidation and corrosion. The masses were taken for each bar before and after corrosion to determine the amount of mass lost due to corrosion. The results showed that lead was the most effective for being used as a sacrificial metal. An analysis of the variance (ANOVA) test showed significant differences in the data and, but the lead was the most effective.

IDENTIFYING THE INTEGRATION SITE OF C-NEU ONCOGENE IN THE MUS MUSCULUS TRANSGENIC MODEL

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Over-expression of the C-Neu oncogene is common with the formation of breast carcinoma in patients. Slaman et al. (1987) demonstrated that C-Neu amplification is a good predictor of time to recovery and survival in breast cancer patients. Therefore, the oncogene is commonly studied by scientists and a C-Neu transgenic mouse model has been developed in order to observe the transgene in vivo. Scientists have determined that homozygous mice tend to develop breast cancer more frequently than both heterozygous and wild type mice. Therefore, it is important to distinguish between homozygous, heterozygous and wild type mice. Surprisingly, in the transgenic mouse genome, the integration site of C-Neu has not been identified. TOPO-linker-specific ligation PCR, an advanced PCR strategy, was used for this purpose. First, purified and isolated C-Neu genomic DNA was digested with enzymes and primed by a gene specific primer. Then the product unerwent two rounds of nested PCR before it was cloned and sequenced. The sequencing analysis indicated that the walked sequence is from semian virus 40. The identification of 1,000 base pairs of semian virus 40 DNA will allow new primers to be designed that will walk further along the vector to identify the integration site of C-Neu. Then, the defined sequences can be used as PCR primers to distinguish between homozygous, heterozygous and wild type mice.

THE EFFECT OF FAMILIARITY AND INSTRUMENTATION IN MUSIC ON THE ABILITY TO CONCENTRATE AND REMEMBER

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Since music has been shown to have an effect on the subconscious, it is important to test what types provoke different responses, such as ability to concentrate and remember. If certain types of music are found to interfere with concentration, then they should not be played in cars where it would be dangerous to be devoid of concentration. If certain types are found to improve memory, they could be applied when studying to improve knowledge more efficiently. The purpose of this study is to find which types of music, familiar or unfamiliar, and non-electronic, partially electronic, and fully electronically instrumentation impairs/improves concentration and memory the most. It was hypothesized that at least one of the mean scores on the tests would differ significantly from the others due to the type of music being played during that test. None of the sources that were found contained experimentation with familiarity in chords and psychological responses, so, in this experimet, tests were conducted where students listened to familiar/unfamiliar chords and songs with varying instrumentation and their cognitive responses were monitored. The students listened to seven different

types of music while they took multiplication tests and memorized lists of words. It was found that there was a significant difference between the different music tests by using an ANOVA analysis at an value of 0.05. A later Tukey test revealed that it was the electric instrumentation and the second of the unfamiliar chord progression were among the most significantly helpful.

USING RESPIRATION RATES TO DETERMIN BASE TEMPERATURE OF VEGETATIVE PLANT CUTTINGS

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Cuttings of Pelargonium xhybrida (geranium), Euphorbia pulcherrima (poinsettia), Osteospermum xhybrida (osteospermum), Diascia xhybrida (diascia), Lantana xhybrida (lantana) and Portulaca xhybrida (portulaca) were harvested from the stock plants grown in the Clemson greenhouses. Cuttings were massed, placed into canning jars and stored in dark controlled environment chambers at 0, 2.5, 5, 7.5, 10, 12.5 and 15 degrees Celsius for five and a half hours. An empty jar was also placed in each chamber to determine the ambient CO_2 levels. After five and a half hours the jars were sealed and left for another half an hour, at which time, two 1-mL air samples were pulled form each jar. The air samples were analyzed for CO_2 using a gas chromatograph in order to determine respiration rates. Trends in respiration rates across the temperatures were used to determine the individual species base temperature— the minimum temperature at which plats continue to respire but are not damaged (e.g, chilling injury). The base temperature is the optimal shipping/storage temperature, and temperatures above the base temperature decrease cutting longevity. It was determined that the base temperatures for geranium, poinsettia, osteospermum, diascia, lantana, and portulaca were 7.5, 5, 5, 2.5, 5, and 7.5 degrees Celsius, respectively.

WHAT ARE THE VARYING EFFECTS OF FERTILIZER AND GIBBERELLIC ACID ON GROWTH OF BRASSICA RAPA?

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The purpose of this experiment is to compare the effects of Gibberellic acid treatment to fertilizer on the growth of three different types of Wisconsin Fast Plants. This study determined which growth enhancer had the highest effect on the plants. Wisconsin Fast Plants (WFP) are rapid-cycling versions of Brassica rapa that have unique properties which give them a 30-day life cycle and makes them ideal for plant growth experiments. Gibberellins are chemicals that stimulate cell elongation and division, speed germination and break seed dormancy. There are more than seventy different types of Gibberellins, and many of them occur naturally in plants. Gibberellins stimulate growth in the leaves and the stems of plants but have little effect on root growth. Fertilizer is an organic or inorganic compound given to plants to stimulate growth. The fertilizer used in this experiment came in the form of solid pellets which were placed in the soil at the tie of planting and contined supplemental nitrogen (N), phosphorus (P) and potassium (K). In this experiment the hypothesis is that the gibberellic acid would have the greatest effect on the dwarf-rosette type of WFP and the least effect on the tall and standard types of WFPs while the fertilizer would have an equal effect on all three types of WFPs. This research could aid nurseries and farmers in optimizing the growth of their plants.

ACCURACY AND PRECISION OF HACH WATER CHEMISTRY TESTING KITS IN NEVADA AND CALIFORNIA HOT SPRINGS

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Hot springs are formed when heated water rises from the ground and creates warm pools, ranging up to boiling temperatures. These springs have unique properties, and the odd levels of certain organic and inorganic compounds, elements, pH, and Oxidation Reduction Potential (ORP or Eh) support diverse ecosystems. Hot springs in California and Nevada all have a high pH, making them interesting. Measurements taken by the Savannah River Ecology Laboratory in these rarely studied springs included sulfate, nitrate, ammonia, orthophosphate, silica, sulfide, ferric iron, ferrous iron, Eh, and pH. These measurements were taken using probes or HACH water chemistry testing kits. These kits were guaranteed up to 55 °C. The kits were tested at 20 °C, 40 °C, 60 °C and 80 °C with standards. This determined what kits and probes were accurate and precise. HACH kits do work at extreme temperatures when certain precautions are followed. Sulfate samles should be acidified in the field. Ammonia should be tested as quickly as possible. Measurement of silica is not very precise, though it is accurate. Sulfide samples should be cooled to room temperature before tests are run. Nitrate, phosphate, and ferrous iron were consistently precise and accurate. The pH probes perform well, and the Eh probe was less precise and accurate as temperature increased. Overall, the temperature did not seem to affect the kits, and the field measurements have been determined to be reliable and correct.

CELLULAR GOWTH SIGNALING WITH ONSET OF CACHEXIA IN $APC^{MIN/+}$ MICE

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Cancer cachexia is the wasting away of skeletal muscle; this syndrome causes nearly one-third of all cancer deaths. This wasting syndrome could be related to the down-regulation of cellular growth signals or the up-regulation of protein degradation. The purpose of this experiment was to determine the cellular signaling related to muscle wasting that is affected from the onset of cancer cachexia. We hypothesized that with the progression of cachexia, muscle growth related signaling would be suppressed. The ApcMin/+ is a mouse model of colorectal cancer, which becomes cachectic after 18 weeks of age. To quantify growth-related signaling, Akt abundance, Akt activation, and androgen receptor abundance were measured. Mice were examined at 13, 18, 22, and 26 weeks of age. The left gastrocnemius muscle was removed at the set time from each mouse and processed for Western Blot analysis. The results of this experiment will aid in understandig the signaling involved in muscle wasting, which could lead to possible diet and exercise treatments to maintain muscle mass.

FISH MEAL VS ALGAL MATTER: A COMPARITIVE LOOK AT THE EFFECT OF ALTERNATIVE DIETARY PROTEIN SOURCES ON THE AVERAGE BODY MASSES OF PENAEUS VANNAMEI

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Over the past few decades, many nations throughout the world have turned to the field of aquaculture in search of a sustainable high protein food source. Yet, as these

industries have spread, they have drawn much criticism from environmentalists, who claim that the feeds used by aquaculturists are just as harmful to the environment as over-fishing. These critics claim that, due to the fact that many commercial feeds derive protein mainly from fish meals, feed companies are merely harvesting from natural populations in order produce pond grown crops. For this reason, many feed producers have been experimenting with alternative dietary protein sources in order to both lighten the load placed upon the natural fisheries as well as increase the health, and thus quality, of the produced organisms themselves. The purpose of this experiment was to test one of these experimental diets against a typical commercial feed. Using eight of the syntetic ponds located at the James M. Waddell, Jr. Mariculture Research and Development Center in Bluffton, South Carolina, populations of Pacific white shrimp, Penaeus Vannimei, were grown over a period of three months. Each diet was administered to four of the eight ponds for the period of the experiment and each pond was then harvested. The total production of each pond as well as such values as percent survival and average individual organism mass for each group were compared. It was found that the experimental diet, being both more environmentally friendly and healthier than the standard, performed equally as well as the standard.

THE REACTION OF TRANSFORMED E. COLI BACTERIA TO ANTIBIOTICS AND COMMON HOUSEHOLD DISINFECTANTS

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The purpose of this research is to investigate the growth of transformed and untransformed E. coli colonies when exposed to different antibiotics and household disinfectants. E. coli was transformed by adding a pAMP plasmid DNA segment to the cell's cytoplasm. Both the transformed and untransformed were exposed to five different substances thought to be harmful to E. coli. These were Ampicillin, Kanamycin, Listerine, Neosporin, and Rubbing Alcohol. The bacteria with the plasmid survived and multiplied when exposed to Ampicillin. The bacteria without the plasmid died when exposed to Ampicillin, indicating that the plasmid creates Ampicillin resistant bacteria. Both the nontransformed and the transformed colonies died when exposed Kanamycin and Neosporin, indicating that the plasmid had no effect on the survival of bacteria when exposed to these substances. Both cultures of bacteria survived in the Rubbing Alcohol and the Listerine© thus, these subtances fail to inhibi the growth of the bacteria with or without the plasmid.

THE EFFECT OF FACE PROPORTIONS ON PERSONALITY PERCEPTION

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In today's society, people put a social emphasis on appearance, especially in the Western World. Everyone is constantly being judged and perceived by everyone else, even on a subconscious level. The question of how and with what criteria people are being perceived is a popular one. This study was designed to research the correlation between facial proportions known to effect attractiveness ratings and personality perception. It was hypothesized that these facial proportions do have an effect on the way people perceive personality from faces. The method used to conduct the experiment required a group of 34 students to take a survey. Subjects were shown 10 slides over the course of two days, one day reserved for the five female faces, one day for the five male faces. Each slide then had 5 faces on it, every one corresponding to five different sets of face proportions;

these were the average face, the baby face, the face compatible with "The Mask", the equal-height thirds face, and the equal-height sevenths face. Then, in four-minute-per-slide time period, subjects individually ranked each face on a scale of one to five for the following characteristics: attractiveness, extraversion, friendliness, honesty, intelligence, optimism, sense of humor, and trustworthiness. In this experiment, there were visual trends in the descriptive information. There were various relationships and similarities between the male and female rankings of face sets and personality categories. Therefore, the experimental hypothesis for this experiment was accepted.

THE DIFFERENCE BETWEEN MALES' AND FEMALES' CONFIDENCE TOWARDS SCHOOL ADMINISTERED SUBJECT TESTS

Emily Niehaus
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High confidence is an important characteristic to possess, especially towards one's school work. It has been shown that males have higher self-esteem than females in high-school. Although the difference is small, these results are relatively consistent with all studies. This experiment was designed to understand the difference between males' and females' confidence towards school tests in College Prep Physical Science and College Prep English I. Therefore, for experiment one, it was hypothesized that males have greater confidence in Physical Science than females. For experiment two, it was hypothesized that females have greater confidence in English than males. The method used for this experiment required students to complete a survey directly before taking a class test. The confidence of the students was determined by the surveys. Statistical analysis was conducted to examine the difference between males' and females' confidence, justified confidence, and possible reasons for onfidence.

THE ANTIBACTERIAL PROPERTIES OF SUBMANDIBULAR/SUBLINGUAL AND PAROTID CANINE SALIVA AGAINST ESCHERICHIA COLI AND STAPHYLOCOCCUS EPIDERMIDIS

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About 2 million people acquire bacterial infections each year while being treated in U.S. hospitals. The number of infected people continues to increase, and unfortunately the bacteria are becoming resistant to the currently used antibiotics. This experiment was designed in an attempt to discover a new form of antibacterial. Submandibular/ sublingual and parotid canine saliva were tested as the possible antibacterial agents. The canine saliva was tested for its antibacterial properties against both Escherichia coli and Staphylococcus epidermidis. It was hypothesized that the submandibular/ sublingual saliva would inhibit the bacterial growth to a greater extent than the parotid saliva. The saliva was tested against the bacteria by using white control disks on agar plates. The bacteria were smeared onto agar plates, and then the saliva-soaked disks were applied to each bacterial plate. The zone of inhibition was then measured around each disk, and if present, antibacterial ativity was indicated. The saliva was grown by itself, and an undetermined bacterial growth was found. Even though the both types of saliva showed antibacterial properties and inhibited the bacterial growth, the data was inconsistent. The bacterial growth created by the saliva itself could have caused the inconsistency around the disks.

THE EFFECT OF VARIOUS ANTI-CORROSIVE COATINGS ON THE CORROSION PROCESS OF IRON

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Corrosion – a costly global problem – impacts iron noticeably, especially because of iron's widespread industrial use. The purpose of this study is to determine which of five anticorrosive coatings (black oxide, alkyd resin, epoxy resin, phosphate conversion coating, cerium salt coating) is most effective in preventing rust; the phosphate conversion coating was hypothesized to be most effective. After materials were located, iron pieces were set aside in six groups of 30 pieces. Each piece was labeled and the masses were recorded. The black oxide group was put into the blacking solution and dipped into a sealant. The epoxy resin and alkyd resin groups were painted. The phosphate conversion coating and cerium salt groups were immersed in solutions for a certain amount of time (20 minutes and 30 minutes, respectively). Masses were taken after coatings were applied. Eighteen glass dishes were filled with 90 mL of 1M HCl. Five iron pieces, grouped by coating, were placed in each glass ad left for three days; fifteen pieces of each coating/control were corroded in one set of trials. The masses were taken at the end of experimentation. The results are as follows: alkyd resin group generally showed the least corrosion while epoxy ester and black oxide showed the most. Through analyzing the results of many one-way analysis of variance tests (critical value $F(5,174,0.05)$ is 2.21) and post-hoc Tukey tests (critical value $q_0(0.05,174,5)$ is 3.858.), it was determined that the significant difference in means was found in the alkyd resin group. Therefore, the hypothesis was rejected.

THE REVERSE ENGINEERING AND REDESIGNING OF A DEVICE UNDER TEST MODULE FOR COMPREHENSIVE INTERFACE TESTING AND DEBUGGING OF THE MOTOROLA 68HC11 MICROCONTROLLER

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The microcontroller is equipped with a Central Proccessing Unit core, memory for the program, memory for data, timers, and input/output interfaces. Often, external circuits are necessary for the microcontroller to interact with the environment or system of which it is a part. However, microcontrollers can become damaged, and due to their multiple components and ports, it is often difficult to identify the damaged components for repair purposes. Through designing and constructing a "Device Under Test Module" for the purpose of testing each individual basic function of the microcrontoller on a detailed level, identification, isolation, and repair of damaged components would become a signficantly easier task. Therefore, it was necessary to build, program, and test such a module. The module is capable of testing the funtionality of each of the eight pins in ports A, B, C, and E. The serial communication port, port D, is also tested in one mode of opeation. The functionality of input/output, A/D conversion, serial communication, and timing capablities of the microcontrollers are all tested through various modes of operation. The microcontroller selected was the Motorola 68HC11A8. The process of constructing the module required reverse engineering of previous models, design and construction of a new model, and comprehensive testing. The Device Under Test Module must also be user friendly, so a user manual has been written to accompany the module.

The module was designed and tested to be fully functional and capable of detected damaged components of a microcontroller.

A STUDY OF THE VELVET ANTS (HYMENOPTERA: MUTILLIDAE) FOUND ON THE PEE DEE RESEARCH AND EDUCATION CENTER

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Velvet ants (Hymenoptera: Mutillidae) were studied at the Pee Dee Research and Education Center (REC) in order to better understand their diversity in this region of South Carolina. Over the course of six weeks, 281 specimens including 13 species belonging to three different genera were collected. Collection techniques included Malaise traps and simple collecting using nets and jars. Weather patterns were hypothesized to be the cause of lower species diversity in the family Mutillidae on the Pee Dee REC than in previous years. The effects of temperature on mutillid activity were observed and observations were also conducted on mutillid copulation.

THE CORRELATION BETWEEN MATING FREQUENCY AND LEVELS OF GENETIC DAMAGE IN DROSOPHILA MELANOGASTER POPULATIONS EXPOSED TO VARIOUS LEVELS OF RADIATION

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The nuclear accident in Chernobyl released a considerable amount of radioactive debris to the surrounding plants and animalsin Ukraine. Among the many species exposed to radiation was Drosophila melanogaster, the common fruit fly. Female flies are the choosier sex due to the fact that producing and laying eggs requires more intake of food and risk of dying than producing sperm. The higher the radiation level, the higher the risks of being sterile or carrying a mutation. Females usually mate as infrequently as possible because male seminal fluids are toxic to them. However, to reduce the risk of wasting eggs or producing mutant offspring, a female will instinctively mate more frequently. Different populations of flies were collected from different areas around Chernobyl. These flies were exposed to differing levels of radiation, which may have caused varying amounts of genetic damage in each population. The purpose was to determine if th amount of radiation the females were exposed to has a direct correspondence to their mating frequency. This was done by allowing individual females to mate with different known mutant males. The mutants served as markers to determine number of times the female mates with the male through the mutation expressed in her offspring. It was hypothesized that the population of females exposed to the highest levels of radiation will have a higher mating frequency. This hypothesis proved to be correct. The population of female flies that was exposed to the highest amount of radiation had the highest mating frequencies.

ENDONUCLEOUS V RECOGNITION OF INOSINE BY FLUORESCENCE RESONANCE ENERGY TRANSFER

Andrew Proctor
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In this research, the recognition and cleavage of Inosine, the deamination of nucleotide Adenine, is analyzed. The protein endonucleous V (endo V) purified from E. coli, has been found instrumental in this process. Wild-type endo V was labeled with TAMRA

dye, which served as a donor in single pair fluorescence resonance energy transfer (spFRET). The dye cy5, acting as the acceptor, was conjugated to single and double-stranded DNA oligonucleotide. Upon the recognition of Inosine by endo V, spFRET occurs, which is demonstrated by the rising of the signal in the acceptor channel. The binding and releasing have been found to be metal-dependent. For example, Mg^{2+} promotes both recognition and cleavage of Inosine, while Ca^{2+} aids in recognition only. This observation using spFRET confirms what previous biochemistry studies have found on the recognition and cleavage of Inosine by endo V.

THE EFFECT OF FIJI, GALA, GOLDEN DELICIOUS, GRANNY SMITH AND RED DELICIOUS APPLES ON STAPHYLOCCOCUS AUREUS

Kayla Randle
Spring Valley High School

The purpose of this study was to determine which variety of apple is more affective in preventing the growth and proliferation of Staphylococcus aureus. It was hypothesized that Red delicious apples would have a greater ability to inhibit the growth of S. aureus. Spectrophotometry was used to test this hypothesis. Five apple solutions were created by blending the peels of the different types of apples with .5 liter of distilled water. The solutions were then inoculated with the S. aureus and incubated. After incubation, the solutions were placed in the spectrophotometer and their transmittance and absorbance were measured. A one-way analysis of variance test was used to compare the mean amounts of growth allowed in each apple solution.

LOSE AN HOUR, LOSE A LIFE: THE EFFECT OF DAYLIGHT SAVINGS TIME ON AIR, RAIL, AND MOTOR VEHICLE ACCIDENTS

Miriam Richman
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Insufficient sleep and disrupted circadian rhythms are major public health and individual safety oncerns. The National Sleep Foundation estimates that as many as one hundred thousand traffic accidents occur annually as a result of sleep deprivation (NSF, 2005), and such sleep-related accidents cause approximately 25 thousand deaths and 2.5 million disabling injuries per year (Coren, 1996). Studies have shown that the effects of even a small disruption of one's circadian rhythm, such as jet lag, can linger for over 5 days (Coren, 1996). One more easily studied event that occurs regularly and has similar circumstances of jet lag is Daylight Savings Time (DST), and since the national energy bill passed July of 2005, extending DST by 4 weeks, this issue has become that much more relevant. This study attempted to determine whether or not DST produces a significant change in the number of accidents in categories of air, rail, and motor vehicle transportation. It was hypothesized tht the number of accidents the week immediately following the DST time change will be significantly higher in the spring and significantly lower in the fall for each category. Data was obtained from publicly available government-based Internet databases for the years 1995-2004 were analyzed using $*^2$ statistical tests. Possible areas for future research include analyzing accident data on New Year's Eve, Superbowl Weekend, and other major holidays.

OBSERVATION AND ANALYSIS OF TWILIGHT O^+ AND OH EMISSIONS IN THE THERMOSPHERE USING FABRY-PEROT INTERFEROMETERS

Tom Rogan
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The aim of the project is to analyze images produced by a Fabry-Perot interferometer located in Arequipa, Peru, which was used to observe twilight emission spectra from O+ and OH present in the atmosphere above 200km during morning and evening twilight. The observatory in Peru uses a high-quality digital camera detector, an ANDOR CCD (Charged Coupled Device), to capture interferogram images formed by observing the twilight O+ emission. The interferograms are image measurements of the intensity of light of certain wavelengths integrated along the line-of-sight through the airglow layer above the shadow height represented by the terminator boundary. By using IDL (Interactive Data Language) software to analyze these images, the plasma speed, temperature, and oxygen density at this altitude can be determined. An important part of the software analysis is the conversion of the data from two-dimensional images into one-dimensional line graphs using he method of annular summing. The resultant line graphs contain peaks, known as fringes, which denote higher emission intensity at certain wavelengths. Examination of the change in fringe shape and position over time produces the results that are of interest in these measurements.

A STUDY OF MACHINABILITY OF NANOSTRUCTURED COPPER USING CARBIDE AND POLYCRYSTALLINE DIAMOND INSERTS

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Bulk ultra fine-grained (UFG) copper has been made using a process known as equal channel angular extrusion. Such UFG copper has higher strength and better ductility than regular pure copper, and it is expected to be used for lightweight engineering and medical applications. However, the machinability information (ease of metal removal) of such UFG copper is still not available and such information is indispensable for its broad applications. The goal of the project was to investigate the machinability of UFG copper. For comparison, both UFG and regular pure copper samples were turned using carbide and polycrystalline diamond tools. Cutting forces, tool wear, chip morphology, and machined work piece surface roughness were measured during the experimentation. After experimentation, it was discovered that the UFG copper was better for machining in every aspect except the tool wear. However, it was shown that the problem with tool wear is olved easily by using polycrystalline diamond tools, which showed little to no wear during the course of experimentation. The findings of the UFG copper machinability will help better machine UFG copper for different applications.

UNDERSTANDING TEENAGERS LIFESTYLE AND THEIR KNOWLEDGE OF OBESITY.

Krupa Sandhinti
Spring Valley High School

Obesity is a major illness in the United States. It affects over 250 million worldwide and over 60 million in the United States alone. Over the past few decades, obesity has

increased at a very alarming rate. It has come to a level such that obesity is now considered an illness by the scientific world.
Physical Inactivity and genes have been proved to be the major causes of obesity. The effect of high weight has severe consequences on the human body, leading to diabetes (type II), high blood pressure heart disease, stroke, gallbladder disease and cancer of the breast, prostate and colon (AOA, 2005).
Wanting a better understanding of the causes of this dramatic increase, I have developed this experimentation to analyze the lifestyle of high school students and their knowledge on obesity to see if a relationship exists, to see if our lifestyle and culture are "breeding" obesity. A survey asking questions on eating patterns, exercise patters, T.V./computer usage patterns and gneral diabetes was developed and administrated to high school students.

EFFECTS OF X-RAY RADIATION ON PLASMID

Ashley N. Schlesselman
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This experiment accessed the effects of x-ray radiation on plasmid DNA. The primary goal was to study how DNA is altered in the process, which can in turn lead to better cancer treatment. Normally DNA is in the form of a double helix with hydrogen bonds between the bases. In it's double stranded form it is known to be supercoilded, while in single stranded form it is linearized. The plasmid DNA samples were divided into these two groups for this experiment. It was hypothesized that the linearized would break apart, or receives the most damage first, since the initial break down process had already begun. The plasmids were made from pAMP and were purified for use in this experiment. The enzyme Hind III was used in restriction digest to linearize half of the samples. Once the samples were completed and purified they were irradiated, using the Linear Accelerator at Carolina's Hospital in Florence, South Carolina. Samples were sujected to radiation dosages up to 60.9 Gray, and for times up to 25 minutes. After irradiation gel electrophoresis was used to obtain qualitative results. This experiment did not support of hypothesis; instead the linearized plasmids stayed intact for all levels of radiation used while the supercoilded broke apart after only 10Gy. Future research is required to understand why the supercoilded broke apart faster than the linearized DNA.

COLLEGE STUDENT SUBSTANCE USE: MOTIVES, CONSEQUENCES AND CONTEXT

Ashley N. Schlesselman
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A sample of college students were asked to complete a survey about their use of alcohol, crystal methamphetamine, ecstasy, marijuana, and tobacco. It was first hypothesized that alcohol use would be most prevalent followed by tobacco, marijuana, crystal methamphetamine, and ecstasy. The second hypothesis stated students would use alcohol primarily to become more talkative, honest, and to dance. Thirdly Marijuana would be used to get high and Ecstasy would be used to stay awake and party longer. Lastly, Tobacco would be used to increase mood. The study supported the first hypothesis, the second with the exception of mood changes being slightly above the other occurrences, and the fourth. The third could not be supported or not supported because the drugs weren't used among our sample.

COMPARISON OF INVERTEBRATES AND LEAF DAMAGE ON THE NATIVE SWEETGUM, LIQUIDAMBAR STYRACIFLUA, AND THE NON-NATIVE CHINESE TALLOW, SAPIUM SEBIFERUM, IN COSTAL SOUTH CAROLINA

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Invasive trees introduced into a new environment often have a competitive advantage over native plants, allowing them to thrive and dominate the native plants in that habitat. The enemy release hypothesis states that invertebrates are adapted (and thus more likely) to feed on native plants than on non-native species in the same habitat. With this in mind, the hypothesis was tested that fewer invertebrates would occur or feed on the Chinese tallow tree (Sapium Sebiferum), an invasive species from China, than on the native sweetgum (Liquidambar styraciflua) in five test sites in Beaufort, South Carolina. One hundred randomly selected trees of each species were sampled to make comparisons on the number of invertebrates present and amount of herbivorous foliage damage on the leaves of each branch. A total of 388 invertebrates were found on the sweetgum trees, while only 160 were found on the Chinese tallow trees. Two sampling methods or herbivorous damage showed that the sweetgum had over twice as much foliage damage as the Chinese tallow. A series of t-tests showed a statistically significant difference in all comparisons made between the two tree species, indicating a greater invertebrate population on the sweetgum. Further research should be conducted to investigate if similar results apply to all invasive species or to only the Chinese tallow tree.

THE DETERMINATION OF HEAVY METALS IN TATTOO INKS

Anita Shah
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Tattooing has become a popular form of body art in today's culture, but often consumers are unaware of the harmful effects tattoos can produce. The Food and Drug Administration does not regulate the pigments in tattoo inks that are injected underneath the skin during tattooing; therefore, manufacturers have the ability to put any substance into the inks. The purpose of this study was to determine how various brands and colors of tattoo inks affect the amount of heavy metals present. It was hypothesized that tattoo inks would contain beryllium, cadmium, cobalt, chromium, copper, iron, nickel, lead, and titanium. Three different brands of blue, green, purple, red, white, and yellow ink and 2 brands of black ink were tested for each heavy metal. Each tattoo ink was digested to remove the organic compounds. Once digested, each ink sample was filtered to remove all solid particles. After the sample was filtered, it was run through the inductively coupled plasma atomic emission spectrometer and the concentrations of each element were displayed. Two two-way ANOVAs, one two-way ANOVA with six ink colors of three brands and another with seven ink colors of 2 brands, were conducted. A significant interaction effect and significant differences between the concentration means of chromium, copper, iron, nickel, and titanium for the types of ink color and brand were observed ($p<0.05$) in both ANOVAs. In both ANOVAs, no significant interaction and no significant differences were observed for beryllium, cadmium, and cobalt. A significant interaction effect was observed for the ANOVA conducted with six ink colors of three brands for the element lead, while no significant interaction effect and no significant differences were observed for the ANOVA conducted with seven ink colors of two brands for lead. Therefore, the experimental hypothesis was rejected.

THE EFFECTS OF STEEL, PLASTIC, WOOD, AND POLYURETHANE COATED WOOD ON THE INSULATION OF TRAFFIC NOISE POLLUTION

Ashwin Shahani
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Noise Pollution is a growing problem as people are deafened by traffic noise daily ("Keeping the Noise"). Recently, it has been determined that materials in highway noise barriers may influence its noise insulating capability. By determining the most beneficial noise barrier material in this experiment, highway noise pollution could be controlled in the future. Barrier materials, namely steel, plastic, wood, and polyurethane coated wood, were analyzed individually and it was hypothesized that the denser materials such as steel and plastic would cause lower sound level readings compared to the less dense materials. The method used to conduct this experiment required 4 boxes with the same dimensions each constructed of the aforementioned materials. A sound level meter was used to determine the noise level reduction (in Decibels) when each box was exposed to traffic noise. No box was used as a control. At ˜=0.05, it was found that at least one significant difference between the mans existed ($p<0.05$), shown by the ANOVA test conducted. A Tukey test revealed that the steel and polyurethane coated wood boxes were significantly different to, and had lower comparison intervals than, the wood and plastic boxes. The experimental hypothesis was partly supported.

GERMINATION SUPPRESSION IN AEGILOPS TRIUNCIALIS BY PARENTAL CHEMICAL EFFECT

Samantha J. Shoppell
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Aegliops triuncialis is an interesting plant species because it suppresses the germination of the smaller of its dimorphic seeds with a chemical effect. This suppression, however, is causing a problem as it helps the species to invade areas, disrupting other species and ecosystems in its introduced range in California. In order to study this chemical, leachates from various populations were used to germinate sets of lettuce seeds, and IR spectra from chemical samples were analyzed and compared to a chemical in a similar species, Aegilops ovata L. Masses of the dimorphic seeds produced in pairs by the plant were recorded and their ratios were analyzed to look for any correlation between ratio or slope and varied chemical strength.

THE EFFECT OF A SIMULATED ELECTROMAGNETIC PULSE ON PORTABLE COMPUTER STORAGE DEVICES.

William Shrader
Spring Valley High School

An electromagnetic pulse (EMP) is an intense pulse of energy, in the radiofrquency spectrum, that disrupts electronic equipment (Ullrich, 1997). This experiment tested the effect of a low energy simulated EMP on portable computer storage devices (floppy disk, keydrive, CD-R, CD-RW). It was hypothesized that the most electronically complex device, the keydrive, would be the most susceptible to an EMP. The low-energy EMP was simulated by a 100 nanosecond electrical pulse of 328 volts. After the devices were subjected to the pulse they were compared to the original data file, using the Comparator Fast software, to determine if any alteration in the stored data occurred. The controls for this experiment were two of each device not subjected to the pulse. It was found that the keydrives had a significant difference from their original file in the

number of bytes used to store the data. The floppy disks also displayed a difference, but it was not statistically significant. This was also observed for the controls for both of these devices. However, when the data file was opened from each device and compared to the original file, no change in the data was found. Both CD devices had no differences in either the number of bytes or the data. It was concluded that the variation in the floppy disks and the keydrives occurred because of formatting errors that occurred while saving the data onto the devices. Therefore, the variations were not a result of the test and the hypothesis was not supported.

THE ROLE OF ET_B RECEPTORS IN AGE- AND SEX-SPECIFIC REGULATION OF ENDOTHELIN-1 INDUCED PAIN IN NEONATAL RATS

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Endothelin-1 (ET-1) is a 21 amino acid peptide that is released during sickle cell anemia crisis, heart attack, as well as some forms of cancer. ET-1 binds to both the ET_A (on the nociceptors) and the ET_B (on the keratinocytes) receptor. When ET-1 binds to the ET_A receptor, the firing of the nociceptors is promoted, causing pain-associated behaviors in rats (flinching and licking/rolling). In contrast, when ET-1 binds to the ET_B receptor, ß-endorphins are released, and bind to μ opioid receptors on the nociceptors, inhibiting the firing of the nociceptors and decreasing pain-associated behaviors. Earlier studies have shown that the postnatal day 7 (P7) rats showed more behaviors than the postnatal day 21 (P21) and postnatal day 60 (P60) rats, implying an age difference. Studies have also shown that the male rats showed more behavior than the female rats, implying a sex difference. In order to uncover the age and sex specific reglation of ET-1 by IRL-1620 (pain reducer), we grouped the rats by age and injected them with either IRL-1620+ET-1, saline+ET-1 or IRL-1620+saline and recorder their behavior. In P21 males, the IRL-1620 treatment increased pain-associated behavior, whereas in the females, IRL-1620 treatment caused no significant difference. In P7 males, the IRL-1620 treatment decreased pain-associated behavior, whereas in the females, IRL-1620 treatment caused no significant difference. We concluded that there was a sex and age difference, since the female/male outcomes and the P7, P21, & P60 outcomes are different. These types of studies build the foundation for age-and-sex specific therapy.

ALTERED ADIPOSE TISSUE GENE EXPRESSION IN $APC^{MIN/+}$ MICE FED A WESTERN STYLE DIET

Mary Beth Smith
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Diet and physical activity level can have a dramatic impact on colorectal cancer risk and development. The high frequency of colorectal cancer in the United States may be related to both the high fat "Western-style" diet and sedentary lifestyle. Adipose tissue synthesizes and releases many hormones and cytokines connected to tumor development. A widely used animal model for the study of colorectal cancer is the $Apc^{Min/+}$ mouse. These mice are heterozygous for a mutated Apc gene, a tumor suppressor, predisposing them for intestinal colon polyps. The purpose of this experiment was to examine adipose tissue leptin gene expression of $Apc^{Min/+}$ mice that underwent high fat diet and exercise treatments. The hypothesis was that the high fat diet will alter gene expression in adipose tissue that would be favorable for cancer development and exercise would reverse this effect. Male $Apc^{Min/+}$ mice were fed Western diets and exercised on treadmills The fat pads were extracted and

homogenized to isolate RNA. The RNA was used to synthesize cDNA. Quantitative Real-time PCR was used to measure gene expression. The results show that lifestyle changes can benefit cancer resistance.

THE EFFECT OF STUDENT STUDY HABITS ON GRADED ASSIGNMENTS

Sabrina Stavonor
Spring Valley High School

The human brain gathers and interprets information differently in each individual. This information's interpretation use, depends on many factors involving how the information was accumulated and how the brain recalls this information. Many scientists attribute better information collection and retention to better self-regulation, or one's own thoughts and actions. Better self-regulators are often found to have better test results due to their tendency to work harder, more carefully, and more often when they study. A student's environment is critical during such study. Certain conditions are believed to be more conducive to information retention and certain conditions are believed to be less conducive. This study was intended to observe the effect of timed study with environmental distractions and timed study without environmental distractions effects student information retention. The students were observed in time groups of 5, 20 , 15 , 20, and 25 minute interval and distraction groups including music, television, the Internet and no distraction, which acted as the control. A one way ANOVA test was conducted at the = 0.05 significance level to determine significant differences among the students' scores for each group in each experiment.

THE EFFECT OF TEA ANTIOXIDANTS ON THE EMISSION OF LIGHT FROM LUMINOL AND HYDROGEN PEROXIDE SOLUTIONS

Sabrina Stavonor
Spring Valley High School

The human body has naturally occurring ions which appropriate electrons from other atoms. These ions are most commonly referred to as free radicals. The removal of electrons from atoms results in oxidative damage, more specifically molecular damage, which is believed to cause both cancer and even aging. Antioxidants, which are thought to prevent this oxidative damage, are often used to combat and neutralize radicals. Tea, rich in such antioxidants, is often taken for such a purpose. This study was intended to observe the antioxidant potency of specific teas and related extracts, as well as to determine whether natural teas or derived extracts were the most potent using the chemiluminescent detection method. The antioxidant potency of samples of green tea, black tea, and two supplemental tea extracts, classified as supplement group one and supplement group two, and water, which was used a control, were tested during the chemiluminescence assays. A one way ANOVA test wa conducted at the = 0.05 significance level to determine significant differences among the antioxidant levels in the tea and supplements. It was determined that the hypothesis was not supported, with the Spring Valley Green Tea Supplement having the best value at an F value of 1036.825 and an value of 2.47.

A 3-D MICROFLUIDIC SCAFFOLD FOR IMPROVED VIABILITY IN CULTURING THICK IN VITRO NEURONAL TISSUE

Elisa B. Storyk
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The successful design, fabrication, and initial characterization of a 3-D active scaffold for re-aggregate neuronal tissue cultures are presented. The active microfluidic scaffold consists of an array of capillaries with fluidic delivery/perfusion capabilities within a 3-D neuronal cell culture. These micropillars replace the 2-D mesh used in classic interface systems while repressing the flow and upholding the brain slices at the interface between perfusate and oxygen. Packaging techniques of the active microfluidic scaffold is also presented and its use is demonstrated by culturing primary hippocampal embryonic rat pup neurons and characterizing cell viability within the system. Successful perfusion and survival in thick brain slices using a microfabricated fluidic interface device is demonstrated. Enhanced exposure of the neural tissue to oxygen and nutritive growth media is reached. Viability was assessed qualitatively using confocal fluorescence microscopy, which effectively visualized the interior of a section of tissue several hundred microns thick. Further assays are being developed to quantify the viability results. Compatibility of brain slice perfusion chambers with micro- and nanotechnology is expected to open new areas of neurophysiology research using multifunction perfusion systems.

EFFECTS OF SENSE AND ANTI-SENSE LENTI-VIRAL VECTORs ON $GABA_{A-1}$ RECEPTORS IN RELATION TO AUDIOGENIC SEIZURES IN LONG-EVANS RATS

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Gene Therapy with viral vectors has become more and more popular in medical research as an alternative and improvement to pharmaceuticals. This study used a lentiviral vector that included sense and anti-sense, to modify GABA receptor genes, and reporter genes hoping to manipulate the number of audiogenic seizures in Long-Evans rats. Previous studies used a Herpes viral vector to change effectively the $GABA_A$ receptor; however, the results were only temporary. The lentivirus is better as a means of gene therapy because t should have more long-term effects. For a behavioral test, the rats were exposed to high decibel white noise for 2 minutes. An animal with an audiogenic seizure would respond to the stimulus by wild running and then a state of clonus. The behavioral results showed both that the sense viral vectors significantly reduced the number of seizures and that anti-sense viral vectors made a significant increase in the number of seizures. Therefore, the goals of the project were met.

CAN AN ADVANCED COMPUTER PROGRAM REPLACE A DOCTOR AT THE DIAGNOSTIC STAGE OF PATIENT TREATMENT

Sudeep Sunthankar
Spring Valley High School

Everyone goes to a doctor periodically. This process requires appointments and long waits in the doctor's office. However, consider the convenience of avoiding some of these events. This experiment was designed to test if a computer could replace a doctor at the diagnostic stage of patient treatment. The variable in this research was the diagnosis by the computer and doctor. It was hypothesized that the computer would be

able to produce a higher percentage of correctly diagnosed patients. Materials for experimentation included a computer and Microsoft Access. The procedure for experimentation began with sending patient-forms to a doctor, who distributed them to patients. A doctor found patients who suffered from influenza, coronary artery disease, and hypertension. Patients recorded symptoms of the disorder as well as the name of the disorder on the form. Patient-forms were then shippedto a different doctor, who diagnosed patients by only looking at symptoms. The actual disorders suffered were unknown during the diagnosis. Once the doctor completed evaluating the patients, the forms were sent back to the researcher. An unbiased party was then allowed to enter the symptoms into the program. The computer diagnosis was recorded and compared to the patient's diagnosis. Similarly, the doctor's diagnosis was compared to the name of disorder given by the patient. There was a significant difference between the doctor and computer after a chi square test was performed at ˜=0.05; therefore, the claim, that there would be a difference in the means between the computer and doctor, was rejected.

DEVELOPING A DYNAMIC AND MODULAR MODELING AND SIMULATION PROGRAM USING SWI-PROLOG/XPCE: LOLA

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

The purpose of the research was to develop a modeling and simulation program called LOLA, Liberal Object Linking Application that improves certain aspects of available programs. One aspect of LOLA is that it must offer a larger variety of figures that represent variables in differential equations. It must als be able to export solutions into Math ML and Graph ML, text markup languages similar to HTML. Any other non-user-friendly features of the currently available programs were also modified in LOLA. The programming language used was SWI-Prolog, an AI based language that stands for Programming in Logic. The GUI, graphical user interface was developed using XPCE (SWI-Prolog's GUI editor).

DEVELOPMENT OF A METHOD FOR VISUALIZING AND QUANTIFYING WATER TRANSPORT IN ENDOCYTIC ORGANELLES

Emily Taylor
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To enable visualization and quantification of water transport across membranes of subcellular organelles, we evaluated four fluorescent probes (aminonapthalene trisulfonic acid (ANTS), Alex fluor 2488, Alexa fluor 546, and Fluoroscein) for their sensitivity to buffers containing D_2O. Alexa fluor 546 showed the greatest sensitivity. It exhibited a 400% intensity increase in a buffer prepared with 50% D_2O versus control. In addition, the lower energy excitation (longer wavelength) of Alexa fluor 546 is known to reduce cell autofluorescence and somewhat limit photo-induced cytotoxicity. Using an Alexa fluor 546 dextran conjugate (10,000 MW), in a HEPES: MES saline buffer system, we confirmed that the Alexa 546 response was independent of pH varying between 4.5-7.5. A linear calibration curve was observed for Alexa 546 dextran response to varying percentages of D_2O in the buffer composition. To test the Alexa 546 dextran response in cells, we loaded lysosomes of J774A.1 cells (a murine macrophage-like cell line) with Alexa fluor 546 dextran via endocytosis. Alexa fluor 546 fluorescence was observed in live dye-loaded cells and time-lapse image acquisition showed an increase in fluorescnce during perfusion with D_2O Ringer's buffer. A reversible decrease in

fluorescence was then observed when the cells were again bathed in H_2O Ringer's buffer. The observed kinetics were rapid. These observations are the first direct measurements of intracellular compartment water flux with D_2O exchange.

DESIGN AND CREATION OF A TAILHOUSING TEST STAND

Daniel Edward Thorpe II
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The failure of parts in military aircraft, is a serious concern to both the military and the manufacturers of military hardware. One of the best ways to avoid failure and the accompanying losses is to be able to accurately predict when a part will fail. My research dealt with this problem. The objective of this research was to design and create a model or test stand that would be inexpensive, portable, and that could otain usable data. The procedure for this project was simple. A design was created for the model using Pro-Engineer Wildfire. "Hand calculations," were made to determine the appropriate size and shape that would endure the required stresses. These sizes and shapes were recorded, and the materials were ordered. When the appropriate materials arrived, the model began construction. A replica of an AH64 Apache helicopter tailhousing was created and motors and a gearbox were mounted to it. The structure of the replica tailhousing was established through welding of the materials, while the motors were attached using nuts and bolts. Upon the completion of my role in this project, the model was successfully created and ready for testing.

THE EFFECTS OF ANGIOTENSIN II ON HYPERTENSIVE HEART FIBROBLASTS

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Cardiovascular disease is one of the leading causes of death in the U.S. Hypertension is a common type of heart disease. The accumulation of collagen, an extracellular matrix protein that is produced by fibroblasts, is a result of heart hypertension, and in humans this hypertension eventually leads to heart failure. During this period of time leading up to heart failure, angiotensin constantly acts upon heart fibroblasts, causing proliferation of these cells and the production of excess collagen (fibrosis). Fibroblasts were isolated from rat hearts at varying times after aortic constriction surgery (pressure overload) and treated with different amounts of angiotensin. The pressure overload model that was used represented hyprtensive heart conditions. Protein extractions and Western Blots were conducted on the samples of fibroblasts after angiotensin treatment, and the effects of angiotensin on fibroblast signal transduction and gene expression were then analyzed. Angiotensin activates multiple signal transduction pathways including mitogen-activated protein kinase (MAP). Data was collected to determine the concentrations of MAP, phosphorylated MAP (pMAP), collagen type I, and beta I integrin present in the fibroblasts after angiotensin-treatment. The amounts of pMAP, collagen, and beta I integrin rose as concentrations of angiotensin increase, yet angiotensin had no effect on the production of MAP. These studies determined the effects of hypertension on the response of fibroblasts to angiotensin. This experiment was conducted under the mentorship of Dr. Wayne Carver.

DNA MAPPING OF A MUTATION CONFERRING CADMIUM RESISTANCE IN THE MODEL PLANT ARABIDOPSIS THALIANA

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

Arabidopsis thaliana plants that have an over expressed IRT1 gene, Iron Regulated Transporter, were screened in a cadmium rich medium to select for a point mutation that allows for the viability of the plants in a harsh environment. A molecular marker, SNP521, along with other markers was used to narrow down the region of the chromosome that this mutation exists. The markers were run through a PCR and then digested using a specific enzyme. SNP521 yeilded a high recombination rate, 0.52%, in the initial testing with 200 plants, showing that this marker is too far away from the mutation and that a new marker should be found. Continued testing by Jennifer Barwick after the initial six weeks of research, has proven this to be the case.

THE EFFECTS OF VARIOUS CLEANING METHODS APPLIED TO ARTIFICIAL TURF ON THE GROWTH OF STAPHYLOCOCCUS EPIDERMIDIS.

Sarah Catherine Tryon
Spring Valley High School

One problem facing the athletic world is the increasing prevalence of contracted infections while playing on artificial turf. The most common bacteria to cause infection is the Staphylococcus bacteria. The purpose of this experiment was to research the cleaning method which eliminated the most Staphylococcus epidermidis from artificial turf. The cleaning methods performed in the study were water, antibacterial soap and water, baking soda and vinegar followed by water, and heat treatment rinsed with water. It was hypothesized that allowing baking soda and vinegar to react on artificial turf and thereafter rinsing it with water would eliminate the most Staphylococcus epidermidis from artificial turf. To perform this experiment, samples of artificial turf were subjected to Staphylococcus epidermidis. The various cleaning methods were performed, after which the amount of bacteria was quantified using a Spectrophotomer. An ANOVA test at ˜=0.05 revealed that there was at least one significant difference among the means of the cleaning methods ($p<0.01$). A post-hoc Scheffé test indicated that there was a significant difference in th means of all the sample groups. The variable with the most significant difference was the baking soda and vinegar cleaning method.

DEVELOPING A SINGLE-MOLECULE TRANSISTOR FROM A TRANS-1 BIS-N-PYRIDYL-PYRROLIDINOFULLERENE DERIVITIVE USING A REGIOSELECTIVE SYNTHETIC STRATEGY

Henry Tucker
South Carolina Governor's School of Science and Mathematics

Discovered in 1985 by Kroto, Curl, et al, who were awarded the 1996 Nobel Prize in Chemistry, Buckminsterfullerene (C60), or more informally [60]fullerene, is the fourth known allotrope of carbon. The stereochemistry of [60]fullerene is particularly interesting, due mainly to its unique icosahedral shape, inviting an almost limitless array of potential functionalizations for the outside shell. In my work, the goal is to attach two Pyrydyl-pyrrolidine adducts in the trans-1 position, where two adducts are situated 180 degrees across from one another, on the [60]fullerene with he Prato

reaction. A process of protections and de-protections on the [60]fullerene, modeled after Bernhard KrŠutler's "Orthogonal Transposition," is utilized as the synthetic strategy. This process uses other adducts that attach in known positions as "place-holders" so others will attach in a preferential location, as opposed to randomly. A series of "transpositions" were used for the final attachment of our adduct.

EPITHELIAL CELLS TREATED WITH GLUCOCORTICOID

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

Steroids used in treatments for various illnesses induce the development of posterior subcapsular cataracts - the mechanism underlying these steroid-induced cataracts remains unknown. The growth of lens cells is controlled by growth factors and the levels of insulin-like growth factor-1 (IGF-1) are affected by steroid treatment, but apparently not directly. IGF-1 levels are regulated by a series of IGF binding proteins and we hypothesized the effect of steroid treatment on IGF-1 occurs via modification of expression of the IGFBPs. DNA array studies indicated that transcription of IGFBP5 was significantly downregulated in lens epithelial cells treated with dexamethasone (a steroid). Real-time quantitative PCR was used to monitor the transcription of IGFBP-5 mRNA over time in dexamethasone-treated lens cells in comparison to actin transcripts. The results revealed that IGFBP-5 transcription declines in cells in relaion to the duration of exposure to dexamethasone. To assay for the cytoplasmic/nuclear localization of IGFBP-5, immunohistochemistry using a monoclonal antibody to IGFBP-5 was performed on lens cells grown in media with or without dexamethasone. The results revealed an enhanced signal for IGFBP-5 protein within the nucleus in dexamethasone-treated cells relative to untreated cells although the evidence was not definitive. It was concluded that a reduction in expression of IGFBP-5 could be one mechanism regulating IGF-1 activity related to steroid treatment.

CASUAL RELATIONSHIPS AMONG INTELLIGENCE DATA

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

Intelligence analysts must deal with a massive amount of information, from which they must discover and relate clues about impending terrorist actions. Each analyst working on processing this data is expected to receive over 500 reports per day. These reports might include police or agent reports of theft, breaking and entering, illegal immigration, or other incidents. The system that I developed automates the processing by relating thedocuments using a modified version of a process called Local Causal Discovery. Our system takes a list of key subjects from each report and determines relationships between the reports based on words found in common among them. The result is a set of related reports that depict a potential terrorist situation.

EFFECTS OF PERINATAL ALCOHOL EXPOSURE ON PLAY BEHAVIOR AND C-FOS EXPRESSION IN THE BRAIN

Anna L. Walton
South Carolina Governor's School for Science and Mathematics

Fetal Alcohol Syndrome (FAS) is characterized by a number of birth defects found in the offspring of a mother who consumed excessive amounts of alcohol during her pregnancy. Using a rat model of FAS, this project aims to determine the effects of

alcohol exposure during development on play behavior and the role of somatosensation in the changes in play behavior. The rats consisted of a group with FAS (which received full perinatal alcohol exposure), an intubated control group, and a non-treated control group. The six test sessions began at postnatal day 35. Two same-sex siblings were placed together for five minutes and their interactions were recorded with a video camera to allow for the scoring of pins and dorsal contacts, both of which are measures of play. For each of the first five sessions, the pairs received injections of different concentrations of xylocaine (which interferes with somatosensory processing) into their dorsal surface. Following the sixth session, the rats were anesthesized and perfused intracardially. Their brains were then examined for the expression of the c-Fos gene in four different areas the prefrontal cortex, nucleus accumbens, caudate-putamen, and somatosensory cortex. C-Fos expression, detected by immunohistochemistry, indicates the activity level in a specific brain region. It has been found that FAS triggers hyper-reactivity in social conditions and this may be due to an increased reaction to sensory cues. It is predicted that c-Fos expression will be higher in the somatosensory cortex of alcohol-exposed rats compared to the control rats.

HYPERCHEM MODELING OF VAN DER WAALS RADII FOR METAL ATOMS

George B. Walton
South Carolina Governor's School for Science and Mathematics

Accurate determination of structures allows one to understand the properties of a particular complex or molecule. A large item in the current understanding of the way structures function is the size and shape of the atoms participating in a given structure. This can be represented by the van der Waals radius or the closest approach of two non-bonded atoms. However, van der Waals radius calculations have not been done in over forty years, and therefore need to be reviewed using modern technology. The methods used for structure determination in this project included Molecular Mechanics (MM) calculations on structures found on the Cambridge Structural Database (CSD). Hydrogen to metal atom lengths are calculated and then recorded. This allows for the determination of a given atom's van der Waals radius. Van der Waals radii were determined for eleven elements: Ba, Ca, Cs, Li, Mg, Hg, K, Rb, Ag, Na, and Sr. The data collected contradicts the available literature on van der Waals radii. Therefore the van der Waals radii data presently in use is in need of revision.

A PRELIMINARY STUDY OF CELL DEATH IN THE HUMAN THP-1 MONOCYTIC CELL LINEA

Jason C. Weeks
South Carolina Governor's School for Science and Mathematics

One of the main functions of macrophages is to consume foreign particles and extra cellular debris which leads to inflammation in the body. The macrophages can also initiate cell death to prevent overgrowth, and failure to do so can lead to many diseases. Two major cell death pathways are necrosis and apoptosis. Necrosis is a type of cell death in which cells swell and break open, release their contents and can damage neighboring cells and provoke inflammation, whereas apoptosis is the normal benign process of cell suicide, in which the cell shrinks, dissolves its contents, and activates phagocytosis by neighboring cells. Adenosine is an anti inflammatory reagent, but the actual functions and mechanisms are currently not known. Previous results from Chen and other laboratories have suggested that adenosne may mediate cell death in

human macrophages. The goal of the study is to determine whether adenosine can cause apoptosis in the human macrophage, THP-1 cell line. The THP-1 Cell Line is a type of leukemia cell found in human infants. Preliminary results suggest that adenosine can reduce cell number and decrease cell viability.

SHEEPSHEAD FECUNDITY: DO AGE AND SIZE AFFECT SHEEPSHEAD REPRODUCTIVE POTENTIAL?

Jessica Wong
Academic Magnet High School

Fecundity trends in age, total length (TL), and body weight (BW) were assessed in sheepshead (Archosargus probatocephalus) for years 2001 through 2004. Sheepshead are fished commercially and recreationally and thus research is required to further understand this species and its reproductive potential. A total of 43 fecund females for the years 2001 (10), 2002 (10), 2003 (17), and 2004 (6) caught in local Charleston, South Carolina fishing tournaments were used in this study. Specimen ranged from 2 to 18 years old, 282 mm to 643 mm (TL), & 677g to 5630g BW. Positive relationships in fecundity were found for age, TL, and BW using correlations testing. However, fecundity showed a stronger relationship with TL and BW than with age, which is best explained by the large vaiation of fish size at age. ANOVA values showed no differences in age, TL, BW, or fecundity over the years. Variations in trends may have resulted from the small sample sizes; thus, sheepshead reproductive dynamics still require more investigation.

EFFECTS OF URBAN DEVELOPMENT ON TOTAL ORGANIC CARBON CONCENTRATIONS IN SOUTH CAROLINA'S WATERWAYS

Josh Woodall
Spring Valley High School

Organic carbon is a necessity of life to all organisms. It is especially necessary to fish and other organisms that live in an aquatic environment. Extremely low or extremely high amounts of total organic carbon may lead to the death of the majority of aquatic organisms. The purpose of this research was to determine if urban development had any effects on total organic carbon concentrations in South Carolina's midlands area waterways. It was hypothesized that the highest total organic carbon concentrations would be found in areas of great urban development. Forty different water samples were collected from various water bodies around the midlands area of South Carolina, and the amount of urban development was quantified as four groups with group one being no development and group four being high development. The samples were then taken to Belle Baruch Field Lab in Georgetown to be tested using a totalorganic carbon analyzer. A series of ANOVA tests will be used to determine if statistical differences are present.

CONJUGATED LINOLEIC ACID (CLA) INHIBITS THE GROWTH OF HUMAN SKIN CANCER CELLS

Michelle Zhang
Spring Valley High School, Columbia

The purpose of this study was to determine if conjugated linoleic acid (CLA) affects the growth of squamous cell carcinoma (SCC) tumor cells and if CLA alters the chemotherapeutic efficacy of 5-FU. CLA is an over-the-counter nutritional supplement

shown to inhibit tumor growth in colon and breast cancers. However, it has not yet been tested on skin cancer, specifically the commonly used A-431 cell line. 5-fluorouracil (5-FU) is a very potent drug currently used to treat a variety of solid tumors. Studies at the Cancer Center at the University of South Carolina have shown the modulation of 5-FU in colon tumors by CLA. In this study, various concentrations of CLA, 5-FU, or a combination of both were tested on the cells. The CLA and 5-FU experiments were statistically analyzed with an ANOVA test and the combination study with an F-test at 0.05 confidence. Results showed a significant difference in the CLA study onl and thus, only the hypothesis for the first experiment was supported. However, cell photographs and descriptive statistics indicated a difference between the means of the combination study. The discrepancy between the results most likely resulted from the small sample size in the combination study.

END

South Carolina
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2006 Meeting Abstracts

PRESENTER NAMES ARE IN **BOLD TEXT**

MYOFIBRIL ASSEMBLY AND ELASTICITY IN DROSOPHILA FLIGHT MUSCLES

Danielle Adler, William Hartley, Catherine Kramp, Artur Veloso
and **Agnes Ayme-Southgate**
Department of Biology, College of Charleston

We are interested in understanding how the myofibrillar structure assembles during insect muscle development, and in particular the role of the projectin protein. This extremely large protein (~1 MgDa) has a modular repeated structure, and localizes over the I-Z-I region of the myofibril in insect flight muscles. Immunofluorescence data indicate that the early assembly of projectin is consistent with its proposed role as the protein component of the elastic C-filaments. In particular, projectin coassembles very early with other Z-band components such as alpha-actinin. We will present data from transgenic Drosophila studies that indicate how different regions of the projectin molecule interact with different parts of the myofibril apparatus. The effects of mutations on these interactions will also be presented. We will also discuss a second set of studies looking at the elastic properties of projectin.

DEVELOPING TOOL FOR MULTI-DIMENSIONAL INTERACTION IN PHYSICS CLASSROOM ACTIVITY

Mikhail M. Agrest
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The growth of the requirements and necessities of contemporary students lead to the necessity creating new methodology of teaching in the classroom environment. One-dimensional approach of lecturer-student interaction and flow of the information was replaced by multidimensional methodology and the tools were developed to implement the method. Power Point Presentation empowers professor's presentation being informative and visual. Each slide is a complete story seen as a developed message.
Written in the genre of mathematical prose, the supplemental workbook for recording notes is engaging students into active work during the professor's presentation. It saves time during the lecture, helps students to make complete lecture notes, keeps students alert during the lecture without taking all the attention to making notes and literary be on the same page with the professor.
Presented method provides the opportunity to cover more material in class with the important for Physics classes derivations and correlation of concepts. It also saves time for discussion qualitative issues, demonstrations, problem solving, etc. 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. Designed for regular students, this tool is especially helpful for students with Learning Disability, particularly with Dyslexia

CHARACTERIZATION OF HIV-1 VIF EXPRESSION

Connie Arthur and William H. Jackson
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HIV, the causative agent of AIDS, is a retrovirus that infects and destroys CD4+ T lymphocytes. Loss of these cells leads to the immunodeficiencies associated with AIDS. Vif (Virion Infectivity Factor) is one of fifteen distinct proteins encoded by the HIV-1 genome. Vif acts to enhance viral infectivity by blocking a host antiretroviral defense pathway, mediated by Apolioprotein B mRNA Editing Enzyme Catalytic Polypeptide-like 3G (APOBEC3G). APOBEC3G is a cytosine deaminase that is encapsidated in progeny virions and transported into newly infected cells, where it introduces G to A transitions in the plus strand synthesis of the viral cDNA intermediate during reverse transcription. Vif binds APOBEC3G and mediates its degradation by an ubiquitin-dependent proteasomal pathway. Since the infectivity of HIV-1 is greatly decreased in the absence of Vif, it may be a good target for antiviral reagents such as ribozymes. Ribozymes are catalytic RNAs capable of cleaving substrate RNA in a sequence specific manner. To test this hypothesis we have designed and cloned a library of hammerhead ribozymes targeted to three potential Vif mRNA cleavage sites. Each ribozyme will be tested in in vitro and in vivo systems to determine their relative ability to inhibit Vif expression. In vivo testing will involve the expression of Vif in tissue culture. The expression vector pCMV-VifFLAG was created by sub cloning the Vif gene from the HIV-1 genomic clone pNL43Luc.R-E- as a fusion gene with the FLAG epitope. Since Vif antibodies are not available, this construct will allow measurement of Vif expression using commercially available FLAG-specific antibodies. Vif expression from the pCMV-VifFLAG vector will be determined transiently in HeLa cells. These cells will be transfected with pCMV-VifFLAG by electroporation and transgene expression will be analyzed by Western Blot. Once Vif expression is confirmed, stable clones will be generated and used for further testing of anti-Vif ribozymes. Supported by NIH AREA Grant: 1 R15 GM66689-01.

OVARIAN LOCALIZATION OF FERTILITY PROTEIN SP22

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SP22 is a sperm protein that is highly correlated with fertility in rats. It has been implicated in sperm-egg interaction, androgen receptor function and protection against oxidative stress. SP22 is widespread in rat and human tissues but has not been localized specifically to the ovary. We used reverse transcription - PCR and immunohistochemistry to study the localization of SP22 in the rat ovary. Total ovarian RNA was isolated from an adult female rat, reverse transcribed and amplified. Sequencing confirmed that the amplicon was SP22 cDNA. To assess cell specificity of SP22, ovaries were collected from 6-10 rats in each of the following groups: 30, 60 and 90 days of age, days 10, 15, 17, 19 and 21 of gestation, and days 1, 2, 8, or 19 postpartum. Ovaries were fixed in 4% paraformaldehyde or Bouin's solution and embedded in paraffin. Sections were stained for SP22 using primary antibody against a 16 amino acid region of the C terminus of human SP22 and HRP conjugated secondary antibody. SP22 was not detected in ovaries from 30-day-old rats. In cyclic rats, weak staining for SP22 was evident in some, but not all corpora lutea (CL). During gestation, SP22 was clearly detected in CL and the greatest staining was observed during late gestation. As gestation progressed, staining for SP22 also became increasingly apparent in the ovarian

stroma. In CL from postpartum ovaries, SP22 staining was absent or very weak. In addition to CL, theca interna and granulosa cells of some follicles stained for SP22. Oocytes stained for SP22 in some follicles of all size classes while others did not stain. The predominance of SP22 in CL during late gestation suggests that it may be important to, or regulated in concert with, the secretion of hormones such as estrogen, progesterone, or relaxin. Supported in part by NIH grant MD00233.

LABVIEW

Shawn Blake, Chris Carter, James Payne
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A small radio telescope can be remotely controlled using a LabView Virtual Instrument (VI). The purpose of the project was to develop the VI, interface it to the drive motors for the radio telescope and accurately point the telescope. The radio telescope was to be used in drift mode thus requiring control of only one of the drive motors. The results indicate that the telescope could be controlled and accurately pointed using LabView. These results could be extended to control of the telescope in tracking mode. *This work has been supported in part by NASA/MU-SPIN (NNG04GC40A), NASA's Space Mission (NNG04GD62G) and NASA URC through a subgrant from Tennessee State (NCCW-0085)

THE SURVIVAL OF ORGANISMS FROM AFRICAN DUST: CHARACTERIZATION OF THE AEROMYCOLOGY OF AFRICAN DUST IN DUST AND NON-DUST EVENTS.

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Each year, millions of metric tons of dust are carried from Africa and deposited in the Caribbean region, compromising terrestrial and aquatic, such as crop cultures and coral reefs. In order to study the survival of fungal organisms from African Dust, seven air samples from Mali, thirteen from the United States Virgin Islands, and twelve from Trinidad and Tobago were received and prepared for identification and characterization in the laboratory. Of the thirteen samples from the Virgin Islands, seven were from the island of St. John and six from St. Croix. The samples were collected during dust, low dust, and non-dusts events between the months of February and August of 2004. The air filters were manually isolated and pure cultures of fungi were selected for carbon-source utilization pattern characterization using BIOLOG. The characterization data was then utilized for the development of an aeromycological profile and to identify the metabolic relationships between the organisms studied. The results obtained yielded the presence of common pathogens such as *Aspergilli*, *Fusarium*, *Cladosporium*, and *Penicillium*. Most of the pathogens known to cause ecological implications in marine and crop ecosystems were found during periods of dust storms. Supported by grants from National Science Foundation, World Bank, Living Oceans Foundation, and NOAA

OBSERVATIONS OF THE SLOWLY PULSATING B STAR HD1976

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This is a report on analysis of the slowly pulsating B star HD1976. This star has been observed since late 1999 by the Four College Consortium Automatic Photoelectric

Telescope (FCAPT). Data from FCAPT is reduced and analyzed through a series of DOS programs and the periodicity determination program Period04. We have confirmed the period of 1.06 days (0.939 cycles/day) found by Waelkens et. al. (1998, A&A, 330, 215) in their analysis of the Hipparcos data. We have also confirmed the period of 2.51 days (0.399 c/d) found in the 2000 Andrews & Dukes study (BAAS 32, #46.03). We have tentatively identified three additional periods at 1.07 days (0.930 c/d), 1.053 days (0.949 c/d), and 1.028 days (0.972 c/d) using Period04. The signal-to-noise ratio observed in these frequencies is significantly higher than the lower threshold generally attributed to noise. The observations of this star used in this study come from four full seasons and three partial seasons. Observation and analysis is still continuing on this star. This work has been supported by a College of Charleston Research Presentation Grant and NSF Grants AST95-28906 and AST05-07551.

HPLC ANALYSIS OF GREEN TEA POLYPHENOL EXTRACTS FROM SKIN CELLS AND SALIVA

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Green tea polyphenols, in the form of catechine derivatives, are rich in tea plant *Camellia sinensis,* fam. These phytochemicals are well known scavengers of reactive oxygen species and free radicals. They are believed to possess antibacterial activity and enhance some immunologic functions including prevention of tooth decay, and some oral and throat cancers. As the interest in the antioxidant properties of these compounds has grown, a number of commercial applications such as skin care products and chewing gum have been developed. In our laboratory, ongoing studies are exploring the use of these catechins as potential chemotherapy agents for combating oral cancers and Sjgrens syndrome, an autoimmune disease affecting the salivary glands. To optimize the best conditions for the absorption of the polyphenol (-)-Epigallocatechin-3-gallate (EGCG) into skin cells, the cells were exposed to lipid soluble polyphenol extracts for different time periods. The extracts were then analyzed by high performance liquid chromatography (HPLC). Additionally, the relative efficiency of absorption of polyphenols from green tea chewing gum, compared to oral administration of green tea tablet, brewed green tea, or concentrated green tea extract, were compared by an HPLC assay of the saliva of number of healthy subjects. The methods and results of these HPLC assays will be discussed.

QUANTITATIVE STUDIES OF CLEAN *B. SUBTILIS* SPORES BY REFLECTANCE FTIR MICROSCOPY

Heather Brooke and Michael Myrick
USC Columbia

A study was conducted to determine the concentration dependency of the mid-infrared (MIR) absorbance of bacterial spores. A range of concentrations of *Bacillus subtilis* endospores filtered across a reflective surface were analyzed by Fourier Transform Infrared (FTIR) reflectance microscopy. Calibration curves were derived from the peaks associated with Amide A, Amide I, and Amide II vibrational frequencies. The detection limit was determined to be 284, 147, and 252 spores for the Amide A, Amide I, and Amide II peaks, respectively. Linear relationships were observed between the

concentrations of spores and baseline corrected absorbance for each frequency studied with correlation coefficients greater than 0.99. The trend remained linear until about 70% monolayer coverage, with the monolayer concentration calculated to be approximately $1.0^* 10^8$ spores/cm^2 . The scattering profile does not follow a linear trend, but instead plateaus as the number density increases, which is shown to be associated with the coherence effects of the scattered light.

PREPARATION AND OXO-TRANSFER REACTIONS OF NAFION-BOUND $[COTMPYP(2)(NO_2)]^{4+}$

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Pentacoordinate (Nitro)cobalt(III) porphyrins (Co(III)P-NO_2) readily catalyze oxidation of a wide range of substrates including alkenes in solution. Using cationic porphyrins immobilized on Nafion® films, we have prepared a heterogeneous catalyst using similar (nitro)cobalt porphyrins as active sites. The preparation and characterization of several derivatives of the cobalt porphyrins immobilized on Nafion® films, including the reduced cobalt(II) porphyrin (Co(II)P), (nitrosyl) cobalt(II) porphyrin (Co(II)P-NO), and five and six coordinate (nitro)cobalt(III) porphyrins, (LCo(III)P-NO_2, where L is an oxygen-bound ligand or no ligand) will be presented. The reactions of the nitro derivatives atom acceptors and their support of catalytic oxidation reactions will be discussed. Supported by NIH INBRE award P20 RR016461

PROBING THE MECHANISM OF DEHALOGENATION BY *C. FUMAGO*

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Caldariomyces fumago chloroperoxidase (CCPO) is the most extensively studied heme-containing halogenating peroxidase. The primary purpose of this protein is believed to be chlorination. We recently reported a novel activity, the oxidative dehalogenation of halophenols, catalyzed by CCPO and suggested an electron transfer process due to radical coupling of para-halophenol substrates. Additionally, analysis of the active site points to an electron transfer type mechanism, as the proximal side of the heme cofactor does not appear to be accessible to bulky aromatic substrates. These substrates are of particular interest because halogenated phenols are often found as byproducts in wastewater in a variety of industrial processes. Additionally, CCPO is very robust and stable at temperatures that typically denature other proteins. Using rapid scan stopped-flow spectroscopy, we herein demonstrate the electron transfer pocess involved with halophenol dehalogenation. We have also probed whether Compound II could catalyze the dehalogenation reaction without Compound I. The CCPO dehalogenation activity could be potentially useful in bioremediation technologies.

USE OF A RENORMGROUP IMPROVED LOW-ENERGY EFFECTIVE POTENTIAL IN A CHIRAL-PERTURBATION-THEORY DESCRIPTION OF NEUTRAL PION PRODUCTION IN PROTON-PROTON COLLISIONS

Ivan Danchev and Kuniharu Kubodera
USC Columbia

Previously, the near-threshold production of neutral pions in proton-proton collision was studied with the use of transition operators derived from chiral perturbation theory and the nuclear wave functions generated by high-precision phenomenological

potentials. A conceptual problem in that approach was that the transition amplitude receives contributions from very high momentum components (above the cutoff scale of chiral perturbation theory) in the nuclear wave functions. In the present work, we avoid this problem by replacing the "bare" phenomenological potentials with an effective one, derived from a bare potential by integrating out momentum components higher than a specified cutoff scale. The use of this effective potential is found to give an enhancement of the cross section for this reaction over the values obtained with bare potentials. Although this enhancement brings the calculated cross section closer to the experimental values, the incident-energy dependence of the cross section is not well reproduced, a problem that seems to indicate the necessity of including higher chiral order terms than considered in the present work.

THE TOXICOLOGICAL EFFECTS OF POST-HURRICANE KATRINA SOIL ON *EISENIA FOETIDA*

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The ecotoxicological effects of post-Hurricane Katrina soils in Chalmette, St. Bernards Parish, Louisiana were studied. Surface soil samples were obtained from eight sites: seven which were flooded during the hurricane and one unimpacted location which served as a background. St. Bernard Parish lies between Lake Borgne on the north, Orleans Parish to the west, the Mississippi River to the south, and the Gulf of Mexico to the east. Chalmette lies within the same flooded levy section as the Lower Ninth Ward of New Orleans, and both were inundated by water spilling from the Industrial Canal. The sample sites were located in an open field area adjacent to a public school area, apartments, and single family homes. These locations were immediately downgradient from chemical facilities and the Murphy Oil Refinery. The background sample location was on non-flooded federal property at the Port of St. Bernard. Soil samples were assessed via chemical analyses and standard soil toxicity tests using earthworms (*Eisenia foetida*). During toxicity testing, *E. foetida* were exposed to the soil in 14-day tests that evaluated both and lethal and sub-lethal endpoints. Minimal toxic effects were observed. Chemical analyses indicated detectable levels of arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver, as well as a number of volatile compounds. However, none of these contaminant levels exceeded soil screening levels selected by the USEPA and the state of Louisiana for non-industrial land use.

ALTERATIONS OF GAD PRODUCTION BY LENTIVIRUS MEDIATED GENE TRANSFER MODIFIES SEIZURE SEVERITY IN GENETICALLY EPILEPSY PRONE RATS

S. Alisha Epps, Donna E. Venable, James R. Coleman, Carl L. Faingold[1] and Steven P. Wilson[2]
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[2]Department of Pharmacology, Physiology, and Neuroscience, School of Medicine, USC

Our previous studies have shown a reduction in seizure behaviors in a developmental model of epilepsy (audiogenic seizures, AGS) using lentiviral gene transfer to alter GAD production. Of current interest are the effects of these viral vectors on the genetic model of AGS, using Genetically Epilepsy Prone Rats (GEPRs) which are selectively

bred in-house at Southern Illinois University School of Medicine. Adult GEPRs were induced to seizure activity (120 dB white noise stimulation for a maximum of 1 minute). Two AGS-tests were performed before surgery and five tests during the 30 day period following surgery. The central nucleus of the inferior colliculus was bilaterally injected with lentivirus vectors (multiply attenuated, replication defective, and self-inactivating) encoding GAD65 sense. While there was no significant change in latency to wild run, the average latency of all five post-tests was marginally increased, $t(7) = -2.251$, $p = 0.059$. Paired t-test analysis also showed an increase in duration of seizure behaviors during post-test 2, $t(7) = -3.06$, $p<0.05$. Additional work using viral constructs, perhaps involving larger areas of infection of epileptogenic tissues, will provide further evidence that altering GABA mechanisms can reduce seizure activity in a genetic model of epilepsy. *Supported by NSF SES-0244632 and EPSCoR EPS-0132573/NIH BRIN 8-P0RR16461A (JRC), Barry M. Goldwater Fellowship (SAE), and Epilepsy Foundation Fellowship (DEV).

HIV-PROTEINS AND ITS NEUROBEHAVIORAL EFFECTS IN NEONATAL RATS

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Department of Psychology, USC Columbia

The current estimate of children (< 15 years) living with human immunodeficiency virus (HIV) and AIDS is 2.2 million (UNAIDS/WHO, 2004). Developmental impairments of cognitive and motor systems are common among children infected with HIV. The neuropathology of AIDS in the brain is believed to be mediated indirectly through the HIV proteins Tat and gp120. The present study was designed to determine the potential role of Tat and gp120 and their interaction on neurobehavioral/developmental milestones in neonatal rats. On postnatal day (P)1, one male and one female pup of 14 Sprague-Dawley litters were bilaterally injected with vehicle (0.5 microl saline), 25 microg Tat, 150ng gp120 or Tat+gp120 (25 microg/150ng). Animals were tested (< P60) for weight, eye opening, righting reflex, negative geotaxis, prepulse inhibition (PPI) of the auditory startle response (ASR), and locomotor activity. The following consequences were observed: (1) body weight was not influenced by protein treatments and was comparable between groups; (2) developmental milestones associated with sensory behavioral events, i.e. eye opening, and sensory gating indexed by PPI were altered by a synergistic effect *via* Tat x gp120 treatment; (3) righting reflex was delayed by Tat and Tat x gp120 treatments; (4) negative geotaxis was attenuated by all protein treatments compared to vehicle-treated animals; and (5) locomotor activity was increased by Tat and Tat x gp120 treatments, but not by gp120 treatment. Results suggest that synergistic effects of the viral toxins are already evident very early in development and further, that Tat-derived toxic fragments may contribute to the neurological and neuropsychiatric impairment related to HIV infection in developing rodents. *Supported by DA13137, DA014401, HD043680.

DETERMINING THE SETTLEMENT RATE OF *ESCHERICHIA COLI* IN A WATER COLUMN

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The presence of large number of fecal coliforms in the sediments has been noted. It has been suggested that these organisms, which primarily come with stormwater runoff, are transferred to the sediment through flocculation and sedimentation. The fecal coliform bacteria have been shown to survive and, to even grow in sediments. The

purpose of this study is to determine the rate at which *Escherichia coli* as a representative of fecal coliforms settles in a water column. The sedimentation rate of the bacteria was compared using pure water, waters of different densities and water containing varying amounts of sand, silt and clay. It was observed that *E. coli* settles at the rate of 2.4 cm/sec in pure water but in water with 1% maltose we observed at rate of O.2 cm/sec and as we changed the density the rate became correspondingly slower. Preliminary date suggest that the presence of sand, silt or clay will also change the sedimentation rate of E. coli.

EMISSION LINE ABUNDANCES STUDY OF A LOW-REDSHIFT DAMPED LYMAN-ALPHA ABSORBING GALAXY WITH KECK LRIS

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We present Keck/LRIS low resolution spectroscopy of a galaxy within 2" from the quasar 3C196 (z = 0.871). The quasar is known to have a 21 cm absorption line and a low-redshift damped Lyman-alpha (DLA) absorption line at z = 0.437. The goal of these observations was to identify the galaxy producing the DLA and to estimate its metallicity and star formation rate. After subtraction of the blended QSO light and extraction of the absorbing galaxy spectra, we have found that redshift of the galaxy is z = 0.4374 Â± 0.0012. We have detected emission lines [O II], H-beta, [O III], H-alpha and [N II] at the absorption redshift, which enabled us to calculate the extinction-corrected luminosities and metallicity indicators. These indicators suggest that the interstellar medium of the DLA galaxy has a high metallicity, comparable to or perhaps twice as much as the solar metallicity. The absolute star formation rate (SFR) is high enough to place the galaxy in the range of starburst galaxies. * Supported by the U.S. NSF Grant AST-0206197

VIDEO GAMES AND SOFTWARE ENGINEERING: A CASE STUDY

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Video games, due to their unique nature and relative infancy compared to other software, are just recently being studied with a strong engineering aesthetic like their traditional counterparts. In this case study, we examine the benefits of using a planned, engineered approach to creating a fun and interactive piece of software. This research centers on an original game, developed by the author. Established object oriented software engineering was applied at every step of the development process. End-user testing will measure the game's fun factor, with results being analyzed to determine the relationship between the engineering behind the game and its final playability. *Supported in part by NSF grant CNS-0353637.

ANTITUMOR ACTIVITY OF SELECTED DERIVATIVES OF 2-(1-PHENYL-1H-PYRAZOL-5-YL)BENZENESULFONAMIDES

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Agrobacterium tumefaciens caused Crown Gall Disease on woody and herbaceous plants. This bacterium will induce tumorous growth on potato (*Solanum tuberosum* L.) discs. The objective of this study was to determine the antitumor activity of selected derivatives

of 2-(1-phenyl-1H-pyrazol-5-yl)benzenesulfonamides. The bacterium was added to potato discs in a 24-well plate along with controls and test compounds. After incubation for 14 days, potato discs were stained with a potassium iodide solution. Potato tissue stained dark purple, but the tumors did not absorb the stain and were cream colored. The number of tumors were counted for each test. The experiments was repeated three times with three replicated per treatment. Activity detected ranged from 50% inhibition of tumor formation to 26% stimulation of tumor formation. The presence of a methoxy moiety on a phenyl ring significantly influences the inhibitory activity of these derivatives. The lack of substituents on the phenyl ring resulted in stimulation of tumor formation. There was no effect of the test chemicals on the growth of the bacterium or the Ti plasmid transfer resulting in tumor production.

CHARACTERIZATION OF BALL-POINT PEN INK BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY AND UV/VISIBLE MICROSPECTROPHOTOMETRY

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Historically and culturally significant documents from past eras are not receiving the conservation treatment necessary to preserve them for the future. For example, paper makers often use a high concentration of wood pulp (cellulose). The acidity increases over time, causing paper to turn brown and become brittle; the inherently high level of acidity may also be reactive to ink components. Finally, ink may also degrade over time via heat or photolytic processes. The first stage in developing improved methods for document conservation is the identification of ink components so that appropriate preservation treatments may be designed and applied. In collaboration with document specialists at the USC Thomas Cooper Library (Holly Herro and Christine Whitaker), we have acquired documents written in ballpoint ink. Protocols for sampling/extraction of ink from documents in a minimally invasive manner have been developed. The diverse chemical structures of colorants and other components in ink provide a chemical basis for their discrimination and identify their characteristic component materials. We have tested the efficacy of different solvent combinations for ink extraction. We have applied high performance liquid chromatography (HPLC) with UV/visible detection for high resolution separations of the various components of the ink formulation. Alternatively, UV/visible and fluorescence microspectrophotometry without prior separation of components can rapidly and nondestructively produce spectral signatures that can be used for discrimination of different inks. With the development of a spectral data base, this information could also identify the ink. This paper will review the chemical nature of inks in ballpoint pens and present recent results on characterization of ink formulations.

SYNTHESIS AND CHARACTERIZATION OF LAYERED OXIDE POLYMER NANOCOMPOSITES

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An important goal of research in the area of polymer nanocomposites is to enhance the gas barrier property of plastics for food packaging and medical applications. Layered additives that are capable of exfoliation into platelets with high aspect ratio provide a more tortuous path for gas diffusion, and therefore improve the gas barrier. Various layered oxides, including clays and perovskites, were synthesized and novel modification techniques were explored. Polymer nanocomposites incorporating these exfoliated materials were prepared and tested for enhanced gas barrier.

CHARACTERIZATION OF THE CHEMICAL COMPOSITION OF LATENT FINGERPRINTS BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY

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The oldest method of personal identification for forensic purposes is latent fingerprint analysis. The ability to identify suspects from fingerprints left at a crime scene is a result of the arrangement of ridges on the finger pads being unique to each person. Recently, with advances in modern technology, researchers have begun to examine whether personal information in addition to ridge patterns can be gained from fingerprints. This information could allow a suspect pool to be reduced even if the fingerprints obtained from a crime scene were smudged or patterns were not matched after being processed in the Automated Fingerprint Identification System. Fingerprints primarily consist of secretions produced by eccrine and sebaceous glands. Chemical components in these secretions include inorganic salts, amino acids, and lipids such as fatty acids and cholesterol. We have adapted a procedure described by Asano et al. for fingerprint extraction and analysis (1). Fingerprint residue samples were collected on glass beads, extracted using chloroform, converted to trimethylsilyl derivatives, and analyzed using gas chromatography-mass spectrometry. While the major constituents in the residue of all volunteers were fatty acids and squalene, chromatograms from female volunteers were often found to contain signature cosmetic ingredients like octyl methyoxycinnamate, a common sunscreen component. Trace amounts of nicotine could also be identified in chromatograms obtained from smokers. In addition, initial experiments suggest that the amount of urea present in fingerprint residues is gender dependent. 1. Asano, K. G.; Bayne, C. K.; Horsman, K. M.; Buchanan, M. V. J. Forensic Sci. 2002, 47, 1-3.

AMMONIA ABSORPTION BY A MICROPOROUS COORDINATION POLYMER

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Ammonia is a substance that is toxic to many living systems. It is therefore important to develop efficient methods for its detection or removal. To this end, we have investigated the inclusion of ammonia by a microporous coordination polymer prepared by the reaction of cobalt sacchrinate with the long spacer ligand 1,4-Bis(3-pyridyl)-2,3-diaza-1,3-butadiene. In a series of experiments ammonia gas was introduced into a flask containing the coordination polymer that was previously heated to 100, 120, 140, or 160° C. The inclusion of ammonia was then monitored using infrared spectroscopy. At all temperatures the infrared spectra showed the presence of the characteristic NH stretch of ammonia. We will present and discuss these results.

PREPARATION OF NEW N-ALKYL-SUBSTITUTED TETRAPYRIDYL(2) PORPHYRINS

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Addition of n-alkyl chains, R, to the pyridyl nitrogen of tetrapyridyl(2) porphyrin, H_2TpyP(2) to make cationic $[H_2TRpyP(2)]^{4+}$ porphyrins and metalloporphyrin derivatives has been previously demonstrated for methyl, ethyl, propyl, hexyl, dodecahexyl, benzyl,

and other N-substituted derivatives. Adaptation of previous methods involving alkyl addition from alkyl iodides has been pursued for synthesis of N-cyclohexyl and N-2-propyl derivatives, $[H_2T\text{-cyhex-pyP(2)}]^{4+}$ and $[H_2T\text{-2pro-pyP(2)}]^{4+}$ that are interesting due to their potential for shifts of reduction potentials as seen for other *n*-alkyl-substituted derivatives, but with more compact structures that may be beneficial for solubility and ion-pairing behavior. Supported by NIH INBRE award P20 RR016461

EXTENDING WEBCRED: ASSESSING THE CREDIBILITY OF WEB SITES

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The evolution of the Internet has made the sharing of information essential to the intellectual growth of human society. Along with the ability to exchange information relatively quickly brings the question of credibility. The credibility of the authors, the quality of the information, and the validity of sources are some of the legitimate user concerns. An automatic assessment of credibility can offer some answers to questions about the credibility of information found on the Web. Through the use of an automated system the credibility of websites can be gauged based on a number of criteria. A program called WebCred has been implemented for this purpose. WebCred rates the credibility of URLs for the medical domain. This program rates the URLs based on the following factors: the number of page errors, credibility of the links, and the number of credible ads. This paper focuses on implementing WebCred for several domains and to provide end-users several levels of security from malicious HTML. Supported in part by NSF Grant CNS-0353637.

EXPECTATIONS FOR PREGNANCY FOLLOWING SURGICAL SPERM ASPIRATION

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Male factor problems result in 18.8 % of couples being classified as infertile. With aspiration of sperm either directly from the epididymis (MESA) or the testis (TESA) and intracytoplasmic sperm injection (ICSI), it is possible to provide men who are incapable of producing viable sperm in an ejaculate, the ability to overcome this severe sperm defect and produce a successful pregnancy. Twenty-eight men who qualified as candidates for MESA or TESA procedures had their gametes aspirated or collected and used, along with their partner's oocytes, to produce embryos via ICSI. The couples were monitored to determine the success of the MESA/TESA techniques in providing a viable pregnancy. Ten of the 28 couples had successful pregnancies with a total of 14 children being delivered. In addition, two couples have on-going pregnancies. In our practice, the clinical pregnancy rate for ART cycles using aspirated sperm is 42.9%. Thus, MESA/TESA techniques coupled with ICSI provide this population of patients with a viable option for producing offspring.

INHIBITORY EFFECTS OF FRUIT EXTRACTS ON MCF-7 BREAST CANCER CELL LINE PROLIFERATION

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The MCF-7 Breast Cancer Cell line originating from a 72 year-old female patient was analyzed for its level of proliferation when grown in media with different types of fruit extracts. The fruits tested were pomegranate, raspberry, strawberry, muscadine and persimmon. These fruits are known to possess anti-oxidant properties, and the purpose of our investigation was to assess whether the fruit extracts were going to inhibit cell proliferation. Fruit extracts were collected following a specific protocol and having all extracts at the same concentrations. Growth curves, microscopy and MTT assay analysis data were collected. The highest level of the MCF-7 cell line proliferation inhibition was observed when using the pomegranate extract at all concentrations (0.5%, 1%, 2%, 5% and 10%). We plan to test these extracts in combination with different chemotherapeutic drugs in order to observe the cell line's proliferation inhibition levels. We would like to assess the fruit extracts' proliferation inhibitory potential and possible substitute agent capability, which would decrease the need of high dosage levels of toxic chemotherapeutic drugs administered to breast cancer patients. *Supported by SCICU Grant

INTEGRATION OF CHRISTIAN FAITH IN BUSINESS CLASSES

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Students of higher education have numerous opportunities to go to different universities and obtain a quality education. Universities like Southern Wesleyan University, have the opportunity and a duty to provide not only academic but also spiritual education to their students. Integration of Christian faith into all kinds of majors will enrich students' experiences and broaden their horizons. Examples in Christian teachings and our Bible provide us with ample of stories that can be applied to almost every academic discipline. I try to use as many examples as possible in my economics, finance and statistic courses, and students do appreciate that. They can connect with the textbook materials better. They feel challenged. In this paper a case study is presented where on the surface Christian way of thinking might be clashing with economist's views, but that is true only at the surface. Good learner will realize that both are complements, rather than substitutes and thus combining them together will result in right analysis and decisions.

CHARACTERIZATION OF SILVER NANOROD ARRAYS AS SUBSTRATES FOR SURFACE-ENHANCED INFRARED ABSORPTION (SEIRA) SPECTROSCOPY

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Preferentially aligned silver nanorod arrays prepared by oblique angle vapor deposition were evaluated as suitable substrates for surface-enhanced infrared absorption (SEIRA) spectroscopy. These nanorod arrays have an irregular surface lattice and are composed of cylindrically shaped silver nanorods of varying length. The average length of the nanorods present in the array is 867.6 nm ± 95.3 nm with an average width of 98.7 nm

± 29.3 nm. This corresponds to an average aspect ratio (h) of 8.79. The surface density of the nanorod array is 13.31 ± 0.48 rods mm^{-2} with an average tilt angle per nanorod of 71.30° ± 4.03°. Chemisorbed organic films of *para*-nitrobenzoic acid (PNBA) were used for the comparison of the infrared responses. Average external reflection SEIRA enhancement factors for PNBA films deposited onto the 1-micron silver nanorod arrays were calculated to be 30.6 ± 8.9 compared to PNBA films deposited onto 500 nm continuous silver films analyzed with infrared reflection-absorption spectroscopy (IR-RAS). Significant SEIRA reflection-absorbance intensity is observed with both *p*- and *s*-polarized radiation at angles of incidence ranging from 25°-80° using these Ag nanorods. Polarization-dependent UV/Vis/NIR spectra of a 867 nm long Ag nanorod substrate supports the idea that the red-shifted surface plasmon of the elongated nanorod array is a contributor to the observed SEIRA response. An increased SEIRA response was observed for PNBA using Ag nanorods deposited onto CaF_2 (e = 7.4) compared to silica glass (e = 3.8). This increase may be attributed to the increasing dielectric constant of the underlying substrate. The detection limit for PNBA deposited onto a Ag nanorod/glass substrate was determined to be 1 ng. Data illustrating the use of this substrate design for dual spectroscopic SERS and SEIRA analysis utilizing the same substrate will be presented.

SEQUENCE ANALYSIS OF THE LEFT END OF THE *BPH* CLUSTER

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LB400 is a gram-negative soil bacterium that is capable of growth on biphenyl as a sole carbon and energy source. The *bp*h clusters in LB400 and several other bacteria, encode catabolic enzymes required for biphenyl metabolism and degradation of polychlorinated biphenyls. Previously, we have shown that an insertion sequence (IS1071) is located upstream of the first gene in the LB400 cluster. Several oligonucleotides corresponding to the end of IS1071, the 5' end of orf0 and internal sequences were designed and used for DNA sequence analysis. We have identified 15 open reading frames that are present in these 1645 bp. Seven of these ORFs have the potential to encode proteins of at least 75 amino acids. One of them (designated orf3) exhibits a high degree of similarity to a number of genes in other bacterial genomes. The amino acid sequence is 87% identical to a transposase from *Methylococcus capsulatus*. We have initiated experiments aimed at cloning this region and examining expression of orf3. * Supported by a Student Research Grant from the Department of Biology and Geology, USC Aiken

FLOW CYTOMETRIC ANALYSIS OF MCF-7 CELL DNA FOLLOWING TREATMENT WITH 17b-ESTRADIOL AND TAMOXIFEN

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In the development, progression and treatment of human breast cancer estrogens and anti-estrogens play important roles. Estrogens are hormones that function as signaling molecules and act on target tissues by binding to the estrogen receptors (ER). Tamoxifen (TAM) is a weak anti-estrogen that blocks ER-mediated cell proliferation in female reproductive tissues. In this experiment we have examined the effects of TAM and 17β-estradiol on estrogen responsive MCF-7 cells, which is a breast cancer cell line. We 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 E2. After 24-hour treatment TAM 10-4M significantly decreased MCF-7 cells at the G0/G1, S and G2/M phases when compared to the control. E210-4M decreased the proportion of cells in the S phase but increased cells in G2/M phase at both 24 and 48 hours of treatment. After 48 hours TAM 10-4M, and E2 10-4M + TAM 10-4M both appeared to exert a blockade at all three phases of MCF-7 cell cycle. These data suggest that even in short term relatively higher concentrations of TAM and 17β-estradiol are growth inhibitory and perturb the cell cycle in MCF-7 cells. *Supported by grants from NIH MD00233 and HD38342, and INBRE Award #P20 RR16461

THE EFFECTS PARP-1 INHIBITORS HAVE ON THE GROWTH OF CULTURED AORTIC SMOOTH MUSCLE

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Poly (ADP-ribose) polymerase-1 or PARP-1 is an enzyme that is an inflammatory signaling molecule activated by DNA damage. Although PARP-1 mediates DNA repair, over activation of PARP-1 is associated with stroke, myocardial infarction, diabetes, and other conditions and inflammatory responses. Based upon this information, it has been proposed that inhibitors of PARP-1 could potentially serve as therapeutic agents for such conditions. A study was conducted to examine the effects three PARP-1 inhibitors have on the growth of aortic smooth muscle cultures from the lean Zucker rat (LZR) and the obese Zucker rat (OZR). The study was carried out using primary cultures of LZR and OZR aortic smooth muscle, grown on DMEM culture media, and treated with serial dilutions of three PARP-1 inhibitors, 3-aminobenzamide and 6(H5)-Phenanthridinone and benzamide. Growth curves of LZR and OZR cultured, aortic smooth muscle were assayed using trypan blue exclusion for the following groups: OZR with inhibitor, OZR without inhibitor, LZR with inhibitor, and LZR without inhibitor. Acknowledgement: Center for Undergraduate Research & Scholarship (CURS), USC Upstate.

MOLECULAR DYNAMICS SIMULATIONS TO EXPLORE THE EFFECT OF CHEMICAL REACTIONS ON THE BOMBARDMENT OF SI WITH C60

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Molecular dynamics simulations of the sputtering of Si by C60 keV bombardment are performed in order to explore how the sputtering yield depends on the incident kinetic energy. The simulations predict that chemical reactions occur between carbon atoms from the projectile and silicon atoms in the solid, which result in the formation of strong covalent bonds. Nearly all of the carbon atoms from the bombarding projectile remain implanted in the silicon crystal. At low incident kinetic energies, a negligible amount of silicon atoms are sputtered from the crystal, and consequently, a net deposit of solid material on the surface is predicted. As the incident kinetic energy increases, the yield of sputtered silicon atoms increases. At 15-keV, more than twice as many silicon atoms are sputtered by the impact as the number of projectile atoms embedded in the crystal, leading to a net erosion of the solid. The simulations predict that chemical

reactions may in some cases result in the formation of a solid deposit on the surface, which is a good explanation for the unexpected observations that have been made in SIMS experiments with C60 on silicon. * Supported by a SURF Research Award administered by the College of Charleston

SYNTHESIS OF HETEROCYCLIC COMPOUNDS USING NEW METHODOLOGY WITH DIANIONS OF BETA-DIKETONES

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A new synthesis methodology for the preparation of dianions of 1-aroylacetone has been developed, and it is being expanded to include the synthesis of useful heterocyclic compounds that cannot be easily prepared by traditional syntheses: unsymmetrical 2,6-pyran-4-ones, 2-phenacylchromones, 2-phenacylthiochromones, 3-benzisothiazole dioxide/beta-diketones, and 2-phenacyl-4-quinolinols. Instead of using individually prepared substituted 1-bezoylacetones and implementing multiple anion condensation-cyclizations with them, the dilithiated beta-diketones are made by monolithiation of acetone with excess lithium diisopropylamide [LDA], followed by condensation with substituted benzoate esters and acid cyclization of resulting intermediates to targeted products. If this dianion-type intermediate is prepared in larger excess of LDA, followed by condensation-cyclization with methyl salicylates. a good yield of impure product, a 2-phenacylchromone, results that may be contaminated with an unsymmetrical 2,6-diaryl-4-pyranone. Other unsymmetrical 4-pyranones are prepared directly by condensation-cyclization of the same dianions prepared in excess LDA with other non ortho-substituted esters, such as methyl para-methoxybenzoate, followed by acid cyclization. The dianions in excess LDA can be condensed-cyclized with methyl thiosalicylate to 2-phenacylthiochromones, or condensed-cyclized with methyl 2-(aminosulfonyl)benzoate to 3-benzisothiazole dioxide/beta-diketones, or condensed-cyclized with isatoic anhydrides or methyl anthranilate to 2-phenacyl-4-quinolinols. The compounds prepared are being fully characterized, including X-ray crystal analysis of select products, and submitted for biological testing, initially in agriculture and then medicine.

DOES THE NUMBER OF OOCYTES RETRIEVED SIGNIFICANTLY IMPACT THE CLINICAL PREGNANCY RATES REALIZED IN ASSISTED REPRODUCTIVE TECHNOLOGY (ART) PROCEDURES?

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Patients seeking a child through ART typically undergo a hormone regimen that stimulates a patient's ovaries to produce numerous follicles. Oocytes harvested from these follicles undergo sperm insemination procedures to obtain the maximum number of viable fertilized oocytes. While this approach has produced clinical pregnancy rates between 35% and 45%, a question of interest is whether or not the number of oocytes retrieved during ART procedures affects the likelihood of realizing a clinical pregnancy. To answer this question, data collected from the ART laboratory at the Greenville Hospital System University Medical Center between 2000 and 2004 were examined. These data included 333 ART cycles from patients participating in their first ART cycle, using their own oocytes, and having their embryos transferred to themselves

three days after oocyte harvest. The association of clinical pregnancy with 19 possible predictors was investigated, with special interest in the relationship of clinical pregnancy to the number of oocytes retrieved. A preliminary univariate analysis was performed to investigate the effect of each of these possible predictors on clinical pregnancy rates. Using the Kruskal-Wallis Rank test for continuous variables and Chi-square contingency tables for categorical variables, the only variables that were found to have a significant effect on clinical pregnancy were age ($P = .1$), the number of oocytes fertilized ($P = .03$), the number of embryos transferred ($P = .003$), and the quality of the embryos transferred ($P = .01$). The number of oocytes retrieved was found not to significantly affect clinical pregnancy rates ($P = .4$) and a comparison of the mean and range of the number of oocytes retrieved from women who became pregnant to women who did not become pregnant revealed that the two statistics were almost identical for each group (mean and range for pregnant group = 15.2; [1-40] and mean and range for non pregnant group = 14.2; [3-40]). However, a logistic regression controlling for age and body mass index indicates that the quality of the embryos transferred ($P = .04$) and the ratio of the number of oocytes retrieved that had a chance of fertilizing to the overall number of oocytes retrieved ($P = .0007$) were significant in predicting pregnancy while the number of oocytes retrieved was not predictive. Thus, the number of oocytes retrieved does not significantly impact pregnancy rates realized from undergoing ART procedures, but the percentage of those oocytes that have the ability to be fertilized does have an affect.

DIABETES AND OBESITY IN THE ETIOLOGY OF CARDIOVASCULAR DISEASE: THE ROLE OF PARP-1

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Diabetes Type II occurs in eleven million Americans and is a powerful risk factor in the development of cardiovascular disease. Three concomitant conditions—hyperglycemia, hypertension and obesity—are referred to as Metabolic Syndrome in humans. The diabetic, hypertensive, obese Zucker rat (OZR) is genetically deficient in functional leptin—a fat cell derived hormone which signals the brain concerning satiety. This rat strain provides a useful animal model in which to study the effects of Metabolic Syndrome on the function of vascular smooth muscle using cultured cells of OZR and lean Zucker rats (LZR) controls. Poly (ADP-ribose) polymerase-1 (PARP-1) is an enzyme implicated in the pathogenesis of several diseases, including diabetes, stroke, and myocardial infarction—conditions relating to vascular dysfunction. The levels of PARP-1 in *in vitro* cell cultures of vascular smooth muscle from OZR and LZR was assayed using colorimetric analysis in 96 well plates. It is hypothesized that hyper-activation of PARP-1 occurs in OZR smooth muscle cells, as an indicator of DNA damage occurring in vascular smooth muscle during the degenerative processes of Metabolic Syndrome. Supported by Teaching and Productive Scholarship Grant #17810, University of SC Upstate.

PREPARATION AND ELECTROCHEMISTRY OF IRON DERIVATIVES OF NEW N-ALKYL-SUBSTITUTED TETRAPYRIDYL(2) PORPHYRINS

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New N-alkyl-substituted tetrapyridyl(2) porphyrins bonded through secondary carbons of the alkyl groups have been used to prepare iron metalloporphyrin derivatives. Cyclic voltammetry of these derivatives has been carried out in polar organic solvents for comparison with similar tetra(N-alkylpyridyl)porphyrins substituted with normal alkanes. Supported by NIH INBRE award P20 RR016461

SHADOWS OF GALAXIES: QUASAR ABSORPTION LINES AND GALAXY EVOLUTION

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The evolution of galaxies and the cosmic history of element formation are fundamental themes in modern astrophysics and cosmology. One way to detect distant galaxies that are too faint to see in their own light is by means of the absorption lines ("shadows") they produce in the spectra of background quasars. This technique offers a powerful probe of the history of star formation and chemical enrichment in galaxies. One major obstacle in trying to understand the evolution of the strong quasar absorption lines known as the damped Lyman-alpha absorbers (DLAs) has been the small number of metallicity measurements at redshifts $z < 1.5$, an epoch spanning 70% of the age of the Universe. In recent surveys with the Hubble Space Telescope and ground-based telescopes, we have more than doubled the DLA metallicity sample at $z < 1.5$. Our results suggest that the global mean metallicity of DLAs does not rise to the solar value at low redshifts, in apparent contradiction with the predictions of most chemical evolution models. On the other hand, using the Multiple Mirror Telescope and the European Southern Observatory's Very Large Telescope, we have recently discovered an unusual absorber galaxy which had 4 times the metallicity of the Sun over 6 billion years ago! We discuss the implications of our studies for galaxy evolution and clues to the nature of the absorber galaxies based on our imaging studies. Supported by NSF grant AST-0206197 and NASA/STScI grant GO-9441.01.

ELECTRICAL CHARACTERISTICS OF TYPE-II SUPERCONDUCTORS

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Virtually all superconductors (with the exception of a few elemental superconductors) are of the type II kind: magnetic flux within becomes quantized into tornado like vortices of swirling supercurrents. The motion of these vortices causes a loss of energy and hence the appearance of resistance, which is counterproductive for practical applications. In our recent work and new class of superconducting behavior was observed in the two-band superconductor Magnesium Diboride, which appears to have the best of both worlds—type-II like survival of high magnetic fields accompanied by a type-I like low-resistance electrical characteristic. This talk will give provide a short introductory

tutorial on this topic and will present our recent results. Support was provided by the U.S. Department of Energy through grant number DE-FG02-99ER45763.

DEVELOPMENTAL EXPRESSION OF GALECTIN-3 IN THE RAT OVARY AND TESTIS

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Galectin-3 belongs to a 15-member family of lectin proteins that bind beta-galactose within numerous glycoproteins and glycolipids. Extracellular galectin-3 has been proposed to mediate cell adhesion whereas intracellular galectin-3 acts as a signaling molecule to regulate the cell cycle, apoptosis, and mRNA splicing in different cell types. Galectin-3 has been previously localized to Leydig cells of the human testis, within the mouse ovary, and in activated macrophages of several species. Using immunohistochemistry, we examined the developmental distribution of galectin-3 in the rat ovary and testis in fetuses at 13.5 and 16.5 day postcoitum (dpc), and in animals at postnatal day 2, 8, 19, 30, and in adult animals (60 days old or older). Galectin-3 immunostaining was not present in the fetal rat gonad of either sex at 13.5 and 16.5 dpc. Interstitial cells with the appearance of Leydig cells stained intensely in all postnatal testes examined. Galectin-3 was not detected in the day 2 ovary, but was detected in the theca interstitial cells at days 8-30, with the most intense staining at day 19. In ovaries, from day 19 onward, galectin-3 was localized to macrophages associated with atretic follicles. Also in adult ovaries, galectin-3 positive macrophages were associated with the centers of newly forming corpora lutea and were uniformly distributed throughout highly regressive corpora lutea. No other staining for galectin-3 was observed in adult ovaries. Starting at day 30 in the male, the Sertoli cells of some seminiferous tubules stained for galectin-3. In the adult rat testis, the Sertoli cells of stage 7 and 8 seminiferous tubules had strong staining for galectin-3 and step 19 elongating spermatid heads were immunopositive as well. Sertoli cells of stage 13 and 14 tubules also weakly expressed galectin-3. The expression of galectin-3 appears to be limited to the androgen-secreting theca interstitial cells of the immature ovary and ovarian macrophages. Testicular expression of galectin-3 is observed in Leydig interstitial cells throughout postnatal development and in Sertoli cells and spermatids at specific stages of the seminiferous epithelium in adult rats. Supported by NIH grants MD00233, HD38342, and INBRE P20 RR016461

MEASUREMENT OF THE ANISOTROPIC MATERIAL PROPERTIES OF CORTICAL BONE USING ASYMMETRIC INDENTATION

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The study of the mechanical properties of bone is an important aspect of biomechanics. By more fully understanding the anisotropic properties of bone, bioengineers and scientists will be able to fabricate custom-made implants for patients that are biomechanically consistent with the native tissue, and will better understand the effects of mechanics on bone remodeling. Indentation testing has been widely performed on bone for the purposes of extracting material properties, but only isotropic properties can be obtained from traditional indentation studies because of the indenter geometry. These tests thus are not able to measure aspects of material response that arise from

the underlying anisotropic osteon microstructure. The objective of this study is to determine the ability of asymmetric indentation to characterize the anisotropic properties of cortical bone.
A Bose 3100 uniaxial testing system was used to perform asymmetric indentation. An asymmetric indenter was manufactured from regular carbon steel with tip dimensions 6.35mm x 0.79mm. Cow femurs were acquired from a local butcher shop. Samples from the mid-diaphysis were cut and milled for smooth and parallel surfaces. Testing was performed on the cortical surface of the bone, in the circumferential-longitudinal plane. The maximum indentation distance was 20um with a loading rate of 5um/sec, using various orientations of the indenter relative to the bone.
Data demonstrate that asymmetric indentation is a viable technique for extracting anisotropic material properties. In particular, the response of the bone to indentation is stiffest when the indenter is aligned perpendicular to the osteon microstructure (longitudinal direction), and the more compliant response is obtained when the indenter direction is aligned with circumferential direction of the bone. These results are consistent with finite element studies, in which the stiffest indentation response is predicted when the long axis of the indenter tip is aligned with the compliant in-plane material direction (circumferential). Coupled with computational analysis, this technique can thus be used to quantify the in-plane, anisotropic, elastic properties of bone.

HIGH-PRESSURE SYNCHROTRON X-RAY DIFFRACTION USING A DIAMOND ANVIL CELL

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High-pressure synchrotron powder diffraction experiments were performed on some ordered double perovskites. The applied pressure induces some of the compounds to undergo a pressure-induced phase transition. These phase transitions are correlated with changes in the type of the octahedral tilting distortion. Several different types of phase transitions and octahedral tilting changes were observed. The high-pressure experimental technique and some illustrative examples of changes in the type of octahedral tilting in ordered double perovskites will be presented.

BAEYER-VILLIGER OXIDATION OF KETONES USING SODIUM PERCARBONATE.

Amber Markley, Ann Willbrand, and Alicia C. Jones
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The Baeyer-Villiger reaction is a well known reaction in which oxidative cleavage of a carbon-carbon bond adjacent to a carbonyl group, followed by insertion of oxygen converts ketones to esters. Although many peroxy reagents have successfully been used for this reaction, it has not found a place in the organic teaching laboratory due to the hazardous nature of the traditional reagents and the long reaction times generally required. Recently sodium percarbonate, the active ingredient in Oxiclean® and similar products, has been shown to be a stable, low cost source of anhydrous hydrogen peroxide that can serve as the oxidant in the Baeyer-Villiger reaction under mild conditions and shorter reaction times. The purpose of this study was optimize the conditions for the Baeyer-Villiger reaction using sodium percarbonate that are appropriate for the teaching

laboratory. A number of examples will be presented to illustrate the scope of this method.

THE EVOLUTION OF ELEMENTS IN GALAXIES

Joseph Meiring, Varsha Kulkarni
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We present elemental abundance measurements of 11 damped Lyman-alpha systems (DLAs) at $.2 < z < 1.5$ from recent observations with the Multiple Mirror Telescope. Absorption features from lines of Zn II, Cr II, Mg I, Mg II, Al III, Si II and Fe II were found and abundances were determined. We discuss the implications of our measurements for the metallicity evolution of damped Lyman-alpha galaxies and the role of dust in galaxies. This work was supported in part by the US National Science Foundation grant AST-0206197 and the NASA/STScI grant GO 9441 to the Univ. of South Carolina.

DOUBLE EXPOSURE HOLOGRAPHIC INTERFEROMETRY

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Holographic interferometry is a technique in which very small movements can be detected through creating double exposure holograms. When an object is under stress, strain will show up on the hologram as a pattern of light and dark lines indicating the areas which moved between exposures. Such displays are easy to exhibit and observe in transmission holograms. Studies like this are very beneficial in determining structural weaknesses in object and have great impact in industry.

CRYSTAL GROWTH OF NOVEL LANTHANIDE CONTAINING OXIDES FROM HYDROXIDE MELTS

Samuel J. Mugavero III, Mark D. Smith, and Hans-Conrad zur Loye
USC Columbia

Hydroxide fluxes have been useful for the growth of lanthanide containing oxide single crystals. We have been interested in the crystal growth of perovskites and perovskite related oxides containing both lanthanide and platinum group elements using a hydroxide flux. Improved understanding of the solubility of rare earths in this flux has led to the preparation of numerous rare earth containing oxide single crystals. The crystal growth and structure of a novel rubidium lanthanum iridate, $La_9RbIr_4O_{24}$, will be presented.

INFLUENCE OF THE NATURE OF SURFACE CATIONS ON INTERACTIONS WITH DNA

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Semiconductor quantum dots, long of interest for their physical and materials properties are becoming favored for robust luminescent probes in biological applications. The size range that makes the semiconductor colloids quantum dots, is also the size range of the natural DNA-binding protein core in chromatin (~7 nm). In our lab we have

developed these nanomaterials as luminescent probes of intrinsic DNA structure. We have found that intrinsically curved DNA adsorb more strongly and quickly to 4.5 nm CdS nanoparticles that have a loose coat of Cd2+ counterions about them, compared to straight DNA. Sequence dependent conformational flexibility is of great interest due to its implications for drug-DNA and DNA-protein interactions. An understanding of the environment dependent sensitivity of DNA structure is necessary to elucidate its structure-function relationships. Interactions of cations with DNA have been extensively explored, and are intimately tied to DNA structure and dynamics. The project is studying how varying the cations on the quantum dot surface influence its interactions with DNAs. For the 40 nm… cadmium sulfide we found that the equilibrium binding constants were significantly different when the quantum dot surface was enriched with different cations.

NEW INDICATORS FOR STRONG BASES: IMPROVED DIPHENYLACETIC ACID DERIVATIVES

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Currently there are numerous methods for the titration of very strong bases including n-butyllithium, sec-butyllithium, Grignard's and amide 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, titration via cleavage of metal-metal bonds.[1] The majority of these methods work very well within restricted ranges of strong bases generating the dilemma of which method is best for the specific circumstance. This problem suggests the need for a method that titrates with excellent accuracy for reagents spanning very wide range of structural and metallo diversity including: including alkyllithiums, Grignard reagents, and strong amide bases.
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 derivatives to develop an indicator with an enhanced profile over existing methods. Early observations with organolithium reagents suggest that the solubility of the diphenylacetic acid amide dianions is greatly improved over diphenylacetic acid dianions and that color change in this class can be modulated by addition of the heteroatoms. These early results suggest that improvements in indicator design can be achieved with derivatives of diphenylacetic acid.

INVISIBLE ORIGINS OF NANOTECHNOLOGY - HERBERT GLEITER AND THE NEGLECTED ROLE OF MATERIALS SCIENCE

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In 1981, Herbert Gleiter formulated and pursued an explicit nanotechnological research program. Arguably, he was the first practicing nanoscale researcher whose work also contributed to the nformation of the NNI. It is all the more interesting, therefore, why

this contribution has gone unnoticed. This neglect is due to the neglect more generally of genuinely nanotechnical achievements in the areas of particles, coatings, and new materials. The paper will propose various reasons for this neglect.

IN SITU SCANNING TUNNELING MICROSCOPY STUDIES OF BIMETALLIC CLUSTER GROWTH: PT-RH ON TIO2(110)

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In the United States and many other countries, the exhaust emission regulations for vehicles have been growing stricter for better control of air pollution. A typical automotive exhaust catalyst consists of nanoclusters such as rhodium (Rh) or platinum (Pt) on a metal oxide support material. Although many of the commercial exhaust catalysts used today are multi-metallic materials, the nature of synergistic metal-metal interactions and metal-support interactions are not completely understood. Due to the complexity of the commercial catalytic materials, we have been studying model systems consisting of metal nanoclusters on single-crystal metal oxides in order to gain fundamental understanding of surface chemistry on the metal clusters for guiding the development of better exhaust catalysts. In this presentation, the growth of Pt-Rh bimetallic nanoclusters, formed by depositing Pt on 0.3ML of Rh predeposited on a TiO2(110) surface, has been investigated using scanning tunneling microscopy (STM) and low energy ion scattering (LEIS). In situ STM studies during Pt deposition show that bimetallic nanoclusters are produced by direct incorporation of Pt atoms into existing Rh clusters or coalescence of nucleated Pt clusters with predeposited Rh clusters. Cluster densities for Pt-Rh growth are lower than those for pure Pt growth, suggesting that the Rh clusters act as nuclei (seed clusters) for the formation of Pt-Rh bimetallic clusters. In situ STM studies at 100K and 450K clarify the Pt-Rh growth kinetics based on the different adatom diffusion rates. LEIS experiments show that Pt does not completely cover the surfaces of the Rh clusters even at the highest Pt coverage, suggesting that Rh atoms can diffuse within the Pt-Rh bimetallic nanoclusters.

SYNTHESIS AND CRYSTAL STRUCTURE OF $Zn(L2)_2(H_2O)_2(NO_3)_2$. [L2 = 1,4-bis(3-pyridyl)-2,3-diaza-1,3-butadiene]

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The title compound was synthesized at room temperature by the layering reaction of L2 in methylene chloride with zinc nitrate dissolved in ethanol. Single-crystal X-ray analysis reveals that the structure consists of discrete Zn $(L2)_2$ $(H_2O)_2$ $(NO_3)_2$ units. The Zn(II) center lies in an octahedral environment, axially coordinated by two pyridyl nitrogen atoms from two symmetry related L2 ligands, and equatorially coordinated by four oxygen atoms from symmetry related pairs of monodentate nitrate anions and water molecules. The other pyridyl nitrogen of L2 is not coordinated to Zn(II), but is engaged in hydrogen bonding with a water molecule from an adjacent Zn $(L2)_2$ $(H_2O)_2$ unit. The synthesis and crystal structure of this compound will be presented.

A TIME COURSE CHARACTERIZATION OF RAT SUBDERMAL ELASTIN IMPLANTS USING HISTOLOGICAL TECHNIQUES

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It is estimated in 2001 82,000 heart valve replacement procedures were performed in the U.S. One major cause of transplanted valve failure is irreversible calcification which reduces mobility of valve tissue. An intradermal implantation model of *in vivo* calcification has been developed in rats, which allows study of the processes involved in the progression. In this study, purified porcine elastin was subdermally implanted into juvenile rats. Aluminum chloride-treated elastin was implanted to evaluate prevention of *in vivo* calcification. Implants from both treated and untreated groups were removed and evaluated histologically with hematoxylin and eosin to visualize overall morphology and thickness of the formed capsule surrounding the elastin implants, for calcium content representing elastin calcification with Dahl's Alizarin Red, for bound aluminum content with Solichrome azurine, and with immunohistochemistry to identify presence of host macrophages. Results revealed that aluminum was lost from the treated tissue over time, with a reverse correlation to the appearance of calcification in tissue surrounding the treated implants as compared to controls. These results confirm the usefulness of the rat implantation model for evaluation of treatments to impede *in vivo* calcification in tissue. Furthermore, aluminum chloride treatment of tissue did retard but not prevent calcification in implants. Supported by SC-BRIN/EPSCoR Award #698-7557-223-2093639

FLEXIBLE OR RIGID CATHETERS FOR INTRAUTERINE INSEMINATION: SHOULD ECONOMICS PLAY A PART?

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Intrauterine insemination continues to be a mainstay of therapy for couples suffering from various forms of infertility; however, very little has been done to technically improve the actual insemination procedure. The pilot study conducted at the Department of Obstetrics and Gynecology of the Greenville Hospital System was designed to prospectively compare pregnancy rates for couples undergoing insemination by a single healthcare provider using either a flexible or rigid catheter. The result of this study indicates no significant difference in clinical pregnancy rates observed between the two types of catheters (22 % versus 16 %, respectively; $P = 0.45$). This nonsignificant difference is mainly due to the lack of power caused by not having a sufficient number of study patients (rigid = 51, flexible = 49). Although the study did not reveal a true interpretation of the validity of using a rigid catheter versus a flexible catheter, valuable data were obtained for further modeling and investigation. A decision tree model was created in order to further investigate pregnancy rates, as well as cost factors associated with rigid versus flexible catheters. To further expand on the initial study, each decision tree arm (flexible vs. rigid) was extended to 100 patients for a more concise analysis. The decision tree model concludes that the flexible catheter is clearly a better choice for the IUI procedure. In terms of cost, the flexible catheter has

a costs savings of $3,079.08 over the rigid catheter. Furthermore, the number of pregnancies achieved is higher for the flexible catheter (~ 10 more than the rigid catheter) when pregnancy rates are subjected to a larger population. Therefore, this decision tree model will prove useful in convincing physicians to select the flexible catheter.

SPECTRAL RESOLUTION IN MULTIVARIATE OPTICAL COMPUTING

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Previous Multivariate Optical Element (MOE) studies have shown that fabricated MOE resolution is 32 cm^{-1} at its best, based on physical thickness limitations for thin films. While MOE resolution restrictions exist, these previously have been negated using high resolution calibration data for the MOE blueprints. However, effect of using high versus low resolution calibration data for the calculation of MOE designs have yet to be shown. Our laboratory's progress with studying the effects of Near-Infrared (NIR) calibration and validation data resolution on MOE design and functionality is presented. In this poster, the question of whether or not low resolution calibration data can produce MOEs which have accurate predictive ability for high resolution applications is tested on a binary system of Naphthalene and Pyrene. Validation results are analyzed using traditional chemometric methods (e.g., PCR) as well as examing the errors of calculated MOE designs. A comparison of these prediction methods is presented, and future applications areas are discussed.

GENERAL OUTLIER DETECTION FOR A HOMOGENEOUS POISSON PROCESS WITH SUM QUOTA ACCRUAL

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In this talk we consider the problem of detecting whether a specific observed inter-event time in a recurrent event data, which is subject to a sum-quota accrual scheme, is an outlier. In addition, we also address the problem of determining if a particular subject or unit is an outlier in relation to the other observed units in light of the recurrent event data. We limit this talk to a situation where the stochastic process governing event occurrences for each subject or unit is a homogeneous Poisson process (HPP), and the mathematical framework utilized to develop the outlier detection procedures is similar to that of Neyman's smooth embedding. Through this framework, we are able to derive jackknife-based procedures. We discuss several conditioning schemes for the sampling distributions of the test statistics, in particular, we discuss the relevance of the Conditionality Principle in this problem. Results of simulation studies regarding power comparisons of the different conditioning schemes will be presented, and the procedures will be illustrated by applying to real data sets in biomedical and engineering settings. *Supported by NIH Grant 2 R01 GM56182

SIMULATION MODEL: CAN WE PREDICT PATIENT SUCCESS IN AN ASSISTED REPRODUCTIVE TECHNOLOGY (ART) CYCLES?

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We present a simulation model to assist couples considering the use of ART procedures to achieve a pregnancy. The model is tailored to handle the individual patient characteristics and financial resources. Patient characteristics and patient decisions are input into the model, and the model displays possible outcomes as well as how those outcomes change with different decisions. The couple's relevant physiological details like the mother's body mass, age, the couple's hormone levels, etc. are some of the patient characteristics included in the model. We examine the critical points of the ART process and hypothesize the distribution of the outcomes at the various stages based on numerous sources, such as previous studies, and data modeling and analysis. Key stages, including harvesting the oocytes, fertilizing the oocytes, and pregnancy are modeled with random variables. The central output of the model is the number of successful pregnancies that result given each couple's history, decisions, and resources. A distribution of the number of successful pregnancies is ultimately obtained from the simulation model. The purpose of a model such as this is to help patients make decisions and to inform them about the likely outcomes of their scenario. It also helps them to visualize the process, and the workings of each of their decisions. The model helps compile the results from several other studies and relates them to actual outcomes. These results can lead to new insights and to further studies. This model can help experts communicate with each other, and as well as help caregivers communicate with patients. In particular, the model provides patients with a way to understand the wide array of possible outcomes and to examine the sensitivity of those outcomes to their medical history and decision making.

REACTIONS OF NO AND CO ON PT AND RH BIMETALLIC NANOCLUSTERS SUPPORTED BY TIO_2 (110)

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The catalytic reactivities of NO and CO on mono- and bimetallic Pt and Rh clusters supported on a TiO_2 (110) surface were studied using temperature programmed desorption (TPD), scanning tunneling microscopy (STM), low energy ion scattering (LEIS), and x-ray photoelectron spectroscopy (XPS). In CO TPD experiments, CO dissociated on Rh and Pt-Rh nanoparticles, shown by a high-temperature recombinative desorption peak, but CO did not dissociate on pure Pt nanoparticles. In NO TPD experiments, NO dissociated on all the surfaces to form N_2 , but no O_2 was observed. In NO + CO TPD experiments, NO and CO preferentially adsorbed on Rh and Pt, respectively, with the result that neither pure metal produced significant amounts of CO_2 . However, the bimetallic surfaces showed significant N_2 and CO_2 production, suggesting that the bimetallic nanoparticles have enhanced catalytic activity compared to the monometallic nanoparticles due to increased coadsorption of NO and CO on the bimetallic nanoparticles.

PEROMYSCUS GOSSYPINUS FROM POINSETT STATE PARK: MOLECULAR AND PHENOTYPIC CHARACTERIZATION

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In many habitats of the Eastern United States mice of the genus *Peromyscus* are the most abundant small mammals to be found and are important in the ecosystem in predator- prey interactions. Four species of this genus, *P. maniculatus* (deer mouse), *P. polionotus* (oldfield mouse), *P. leucopus* (white-footed mouse) and *P. gossypinus* (cotton mouse) are found in the Eastern United States but generally vary in geographic habitat. *P. leucopus* and *P. gossypinus* share overlapping ranges in South Carolina. The aims of the project were to determine habitat preference of *Peromyscus* species and their identification and characterization at Poinsett State Park in Sumter County, South Carolina, using traditional morphological methods as well as modern molecular, digital radiography and biochemical techniques. A two year field study was conducted and mice were captured using small Sherman- live traps. Animals were weighed and sexed, and measurements of total body length, tail length, hind foot length, head and ear length were recorded. Footpad number, dorsal and ventral pelage were also noted. Tail DNA was extracted and amplified by polymerase chain reaction (PCR) using microsatellite markers. Digital radiography of skull and mandible, and biochemical analyses of electrophoretic variants of the two subunits of glucose phosphate isomerase was conducted. An analysis of captured mice using these varying techniques indicates that *P. gossypinus* currently is the dominant species in low-lying riparian zones at the study site. Future research will focus on obtaining a more accurate estimation of populations of *P. gossypinus* relative to other *Peromyscus* species at Poinsett State Park.

H TRANSFER IN 2-NITROPHENOL NEUTRAL AND ION: A COMBINED AB INITIO G2 (MP2) AND RRKM STUDY

John S. Riley
DSB Scientific Consulting

Neutral 2-nitrophenol is a model compound for studying fast reactions in nitroaromatic explosives. A key initial step in such energetic decomposition is generally believed to be tautomerization via H transfer. In addition, cationic 2-nitrophenol is the simplest nitroaromatic that exhibits a key water loss reaction in a mass spectrometer ion source. In this study, G2 (MP2) calculations were used to compute the energetics of the H transfer tautomerization in the neutral and ion that suggest both reactions occur by an analogous mechanism. RRKM rate theory using the ab initio energetics and potential surface curvatures was used to compute reaction rate vs. internal energy functions. In the case of the ionic reaction, the computed rates were compared to experimental rate measurements to determine the potential role of tunneling in this reaction. Finally, a model linking the neutral and ionic reactions is discussed that may aid the study of detonation mechanisms for the neutral using an ion mass spectrometer.

SYNTHESIS AND CHARACTERIZATION OF MULTILAYER $BI_{1.6}PB_{0.4}SR_{1.85}CA_NCU_{2N+1}O_X$

Nathaniel Robinson, Derrick L. McCrae and Jafar Amirzadeh
Morris College

A modified solid-state reaction is used to synthesized multi-layer bismuth high Tc superconductor $BI_{1.6}PB_{0.4}SR_{1.85}CA_NCU_{2N+1}O_X$. The number of Ca layers ranged from n=2 to n=9. 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. Supported by NSF Grant

PROBING ELECTRIC FIELD GENERATION IN SUPERCONDUCTORS USING A DC TRANSFORMER

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Several mechanisms lead to the generation of electric fields and resistance in a type-II superconductor. Under typical conditions the electric field arises mainly from the motion of quantized flux vortices. However under exotic conditions, such as extreme current densities, other mechanisms such as phase slippage and the formation of hot zones can contribute. This talk will summarize the mechanisms of electric field generation in superconductors and discuss our experiments to understand their role using the Giaever DC transformer technique. Support was provided by the U.S. Department of Energy through grant number DE-FG02-99ER45763.

ION-PAIRED COMPLEXES OF IRON PORPHYRINS AND NAFION® MONOMERS IN SOLUTION

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Soluble Nafion® monomers having anionic sulfonate groups strongly interact with cationic iron porphyrins $[FeTMpyP(2)]^{5+}$ and $[FeTMpyP(4)]^{5+}$. These solution-phase complexes are proposed as models for porphyrin-Nafion® structures that occur in bulk-phase Nafion®. Modeling these structures and interactions is important because of the potential use of Nafion® as a support for heterogeneous metalloporphyrin catalysts. The solution-phase complexation has been studied in buffered water/alcohol mixtures and in polar organic solvents with regard to their solubilities, stoichiometries, equilibria, electrochemistry, and uv-visible and fluorine-19 NMR spectroscopy. Computational modeling has been used to correlate experimental observations of a specific 2:1 (Nafion to porphyrin) aggregate with likely structures. Supported by NIH INBRE award P20 RR016461

PRECISION IN MULTIVARIATE OPTICAL IMAGING

M. N. Simcock and **M. L. Myrick**
USC Columbia

Multivariate optical computing (MOC) is a method of performing chemical analysis using a multilayer thin film structure known as a Multivariate Optical Element (MOE).

Normal chemometric techniques for chemical analysis typically involve developing a regression vector based on a set of calibration spectra. In the case of an MOC the regression vector is encoded into the MOE which is placed in the analysis beam path, usually at 45 degrees. The vector encoded into the MOE is them applied to the probe beam in the form of the reflection and transmission from the MOE which is measured. Recently we have been developing the MOC technique for imaging problems using an imaging MOE in a normal incidence geometry. There are several important differences between the 45 degree geometry and the normal incidence geometry, one of which is the measurement precision due to photon counting. Here we will describe how the precision compares to 45 degree MOC and how designs which have similar values in terms of SEC, SEP and gain values may vary in precision because of how the MOE regression vector interacts with the spectra.

A STUDY OF HD21071 BASED ON NEW DATA

Melissa Sims and Robert Dukes Jr.
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This project is the continuation of a study of the variable star HD21071, which has been on the observing program of the Four College Consortium Automatic Photoelectric Telescope (FCAPT). HD21071 was previously determined to be 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). Mills, L. R., et. al. (BAAS 31, 1482, 1999). confirmed the proposed period and suggested a .870 day (1.15 c/d) period. Andrews, J. E, et. al. (AAS Meeting 203, #83.14, 2003) reconfirmed the .841 period and suggested other possible periods. This project incorporates one more season of data and uses the Period04 program to ascertain frequencies in Stromgren uvby filters and the Filemaker program for accounting purposes. HD21071 has been observed since 1998. During the study of the new data, additional periods of .704 day (1.42 c/d), .775 day (1.29 c/d), and 1.14 day (.878 c/d) are suggested. The reality of the determined frequencies was tested using multiple methods including least squares analysis and a check of the signal to noise ratio. This project was made possible by the SCAMP and SURF programs at the College of Charleston. * Supported by NSF Grant AST-0071260 & AST-050755

ACCESS CONTROL ON THE SEMANTIC WEB

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The growth of the semantic web has brought with it increased attention to the issue of web security; new access control models are appropriate to handle this new environment. The research described here builds upon the work of Stoica and Farkas in development of a model which removes critical components from view while maintaining a minimal set of semantic relationships; graphs are used to represent semantic and structural relationships. A Java tool was developed to parse either a DTD (Document Type Definition) or XML document, create a modified graph representing a partial view, and display the graph as text and/or trees. Some changes to the original algorithms were required for the implementation. *Supported in part by NSF grant CNS-0353637.

CATALYTIC DECOMPOSITION OF PEROXYNITRITE BY NAFION-BOUND IRON PORPHYRINS

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Peroxynitrite, PN, is an important biochemical oxidant that occurs in inflamed tissues. It is known to undergo catalytic rearrangement to nitrate ion in the presence of iron porphyrins in solution. Cationic iron porphyrins ionically immobilized onto Nafion® films also catalyze the decomposition reactions of PN. A solution-phase model system based on the ion-paired complex of Nafion monomers and $[FeTMpyP(2)]^{5+}$ has been used to investigate the catalytic decomposition of PN by stopped-flow kinetics in buffered alcohol-water mixtures and in polar organic solvents. Supported by NIH INBRE award P20 RR016461

HOW DO WE KNOW WHAT WE KNOW?: A STUDY OF TWO VARIABLE STARS AND METHODS OF VALIDATING RESULTS

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One of the most common ways of determining frequencies of variation in time series is the use of a variation on Fourier analysis known as the periodogram. Period04 is a program that implements the Deeming version of the periodogram. An advantage to Period04 is its ability to compute a measure of the validity of a signal by calculating a signal-to-noise ratio (SNR) defined as the ratio of the amplitude of a signal to the average of all points in a periodogram of the residuals after the signal has been removed. In order to calculate this average, it is necessary to specify the range known as the box size. Empirically, workers have found that signals with SNRs greater than 4.0 are usually real signals. However, little work has been done comparing results with various box sizes. One group typically uses a box size of 2 cycles/day while another uses 5 cycles per day. In this paper we attempt to determine this appropriate box size for standard (SNR) calculations for periods in the range of 0.3 - 0.8 cycles per day, which are typical for the pulsations of the Gamma Doradus and Slowly Pulsating B (SPB) stars. To do this, we will use artificial data that mimics observations for these classes including data spacing and noise typical of observations with our Automatic Photometric Telescope. * This work has been supported in part by NSF grants #AST-0071260 and AST-0507551to the College of Charleston and by the South Carolina Space Grant Consortium.

LEAD UPTAKE BY PLANTS IN CONTAMINATED SOIL

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The neurotoxic effects of lead, particularly on young children, are well established. Lead based paint on homes built prior to 1978 is a continuing health hazard. Remediation efforts, such as scraping and sand blasting, were observed to leave paint chips and dust that became incorporated into the surrounding soil. Leaching of lead from paint chips and its subsequent uptake by plants (*bahia* Pensacola and R*aphanus savitus*) was investigated. The effects of both decreased pH and increased iron concentration on lead uptake were examined.

GENE EXPRESSION IN LB400

Frankie Spradley and James R. Yates
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The *bph* cluster of LB400 is a group of genes that encode enzymes for biphenyl metabolism and polychlorinated biphenyl degradation. To encode these enzymes, transcription must be initiated at a promoter region to make mRNA. The promoter called P1 transcribes *bphA* and two other genes (*bphE* and *orf1*). We have examined the expression of *bphF*, located downstream of *orf1*. It is possible that *bphF* was also transcribed with these three genes. To test this possibility, reverse transcription polymerase chain reaction (RT/PCR) was performed using oligonucleotides that bind to the 3'-end of *orf1* and the 5'-end of *bphF*. We have shown that *bphF* is present in a polycistronic transcript containing *bphA, bphE* and *orf1*. Thus, it appears that one promoter controls the expression of at least four genes of the cluster. * Supported by a Student Research Grant from the Department of Biology and Geology, USC Aiken

THE VASCULAR FLORA OF PUMPKINSEED ISLAND, GEORGETOWN COUNTRY, SOUTH CAROLINA

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The vascular flora of Pumpkinseed Island, a nine-hectare island in Winyah Bay, South Carolina was sampled in August 2004. The islands 2004 flora consisted of 12 species, 9 genera and 7 families; all species are native. The largest family in the flora was the Asteraceae with five genera and five species. The most abundant vascular plant species were *Juncus roemerianus, Spartina cynosuroides, Spartina alterniflora* and *Iva frutescens*. Portions of the island are subjected to daily flooding. The island is totally flooded during new and full moon tides. Hurricane Hugo inundated the island with a 4.3m storm surge on September 21, 1989 along with 112km/hr winds. Wrack, dead culms primarily of *S. alterniflora* additional marsh grasses and assorted debris covered most of the island to a depth of 40cm or greater immediately after Hugo. *Scirpus robustus*, common at the island prior to Hugo, was not observed in the 2004 survey.

SOME ECOLOGICAL OBSERVATIONS OF A MARITIME LIVE OAK FOREST AND PRIMARY DUNE COMMUNITY, DEBIDUE BEACH, SOUTH CAROLINA

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Department of Biology, St. Johns University

A *Quercus virginiana* dominated maritime forest community and primary dune community at Debidue Beach, South Carolina, were sampled by the quadrat method during the summer of 2004. *Quercus virginiana* (relative dominance 95) was the dominant tree of the maritime forest. *Ilex vomitoria* and *Smilax* bona-nox were the dominant shrub and liana respectively. Five additional woody taxa were encountered in the sample plots within the maritime forest. *Spartina patens* (100% frequency) and *Uniola paniculata* (65%frequency) were the dominant species at the primary dune. Other vascular plants encountered in quadrats were *Hydrocotyle bonariensis, Ilex vomitoria, Panicum amarum* and *Cakile edentula*. Seven additional taxa including the insidious *Vitex rotundifolia* were also observed. Salt spray tolerant *V. rotundifolia* should

be eradicated at Debidue Beach before it spreads and becomes established on additional coastal beaches of the southeastern United States.

A PRELIMINARY STUDY OF THE VASCULAR FLORA OF VIRGINA'S BACK BAY REGION

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The Back Bay region in Virginia was surveyed for vascular plants at False Cape State Park and Back Bay National Wildlife Refuge from 1990-2005. The areas past and present flora consists of 540 species, 297 genera, and 107 families. Three hundred fifty three dicot species and 187 monocot species compose the flora. The Asteraceae and Poaceae, each with 67 species were the largest families in the flora. Other large families were the Cyperaceae, 46 species and Juncaceae 17 species. Eleven species of orchids occurred here; few coastal areas support as rich an orchid component as Back Bay. Thirty four Virginia rare plants have been identified. The rarest taxon was *Bartonia verna,* a new state record. Non-native vascular plant species were not as numerous as native species; however, their presence may pose a threat to native vascular plants. The most problematic non-native species were *Eragrostis curvula, Lonicera japonica, Microstegium viminium,* and *Phragmites australis.*

DIOXOMOLYBDENUM(VI) COMPLEXES WITH S,N-DONOR LIGANDS

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The Chemistry of molybdenum(VI) has been well-established through numerous papers published over the past several decades. However, there are few studies on the chemistry of dioxomolybdenum complexes containing sulfur and nitrogen as donors. This paper will present a novel method of synthesizing water-soluble and extremely hygroscopic dioxomolybdenum complexes with orthomercaptobenzoic acid (a sulfur, nitrogen donor ligand) and other similar ligands. Details of the synthetic procedures and characterization of the complexes will be presented.

EFFECTS OF OBESITY AND MITOGENS ON THE GROWTH OF VASCULAR SMOOTH MUSCLE

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Obesity, hyperglycemia, hyperlipidemia and hypertension compose Syndrome X in rats, which is similar to Metabolic Syndrome in humans. An *in-situ* study was made of the effects of obesity on the number of blood vessels present in the heart, brain and pancreas of obese Zucker rats (OZR), as compared with lean Zucker rats (LZR) by analyzing paraffin H & E slides and classifying and counting vessels. Slides were studied using light microscopy and the Student t-test was used to compare data. Preliminary results indicated significant differences in the number of arteries—OZR having significantly fewer arteries than LZR. The differences in the number of arteries may partially explain the hypertension that accompanies obesity. Further observation of brain tissue slides showed that there were more nuclei in the second granular layer of the cerebral cortex of OZR as compared to LZR. Results from comparing heart tissues of OZR and LZR indicated a significant difference in number of both arteries and veins. Larger numbers of arteries and veins were found in LZR compared to OZR. Results from comparing

pancreatic tissues of OZR and LZR indicated no significant difference in the number of blood vessels. A second experiment was an *in-vitro* study of growth curves of cultured rat smooth muscle cells in response to various growth factors (mitogens). The effects of varying levels of Epidermal Growth Factor (EGF), Fibroblast Growth Factor (FGF) and Insulin to stimulate growth of cultured aortic smooth muscle cells from Sprague-Dawley rats were studied. Acknowledgement: Center for Undergraduate Research & Scholarship (CURS), USC Upstate.

NEUTRINO-NUCLEUS REACTIONS RELEVANT TO THE ATMOSPHERIC AND K2K EXPERIMENT

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The latest series of atmospheric and solar experiments gave strong evidence for neutrino flavor oscillations and confirmed the existance of the non-vanishing neutrino masses. The quasi-elastic neutrino-nucleus reactions play important roles in these neutrino oscillation experiments. Their description involves various nuclear effects like final state interactions, initial binding effects, etc. To interpret the experimental results we need to find a reliable model describing these effects. As the first step towards this goal we concentrate on the Fermi gas model, which provides a simple description of the neutrino-nucleus reactions. We include the Fermi motion, Pauli blocking and the effects of the initial nucleon binding energy. We compare our results with those obtained with the use of a realistic spectral function. We also compare our calculation with the experimental data for carbon and oxygen.

CONCLUSIONS ABOUT THE EFFECT FREEZING LOCATION HAS ON POST-THAW DEVELOPMENT OF HUMAN EMBRYOS MAY DEPEND ON STATISTICAL APPROACH USED TO ANALYZE THE DATA

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Many infertile couples have turned to assisted reproductive technology as their last hope for conceiving children. In this process, oocytes are retrieved from the ovaries and inseminated in the laboratory. The oocytes that are normally fertilized are nurtured to the four- to eight-cell stage of development and transferred into the uterus of the female. Before beginning this procedure, however, the couples have several decisions to make, two of which are: What is the maximum number of embryos to be transferred? What is to be done with embryos in excess of this number? One common option for the latter is to cryopreserve excess embryos for possible use in subsequent IVF cycles. Freezing of the embryos is accomplished using liquid nitrogen that is theoretically distributed evenly throughout the cylindrical-chambered freezers, which are specially designed to provide a uniform temperature throughout the chambers. However, previous investigations with mouse embryos suggest that the quality of post-thaw embryo development may depend on position within the freezer chamber. Our goal, in this project, is two-fold: (1) To conduct a retrospective study to determine whether or not freezing position has an effect on the post-thaw quality of human embryos, as measured

dichotomously for each embryo by whether or not it was subsequently chosen for transfer to the uterus, and (2) to compare and contrast the effects that different statistical methods and assumptions can have on the conclusion of the freezing position investigation. At issue statistically is the lack of independence in outcomes between embryos from the same mother; traditional logistic regression analysis is based on the assumption that observations are independent and hence is not appropriate for our situation. The method of the generalized estimating equation (GEE), however, allows logistic regression to be performed while taking the relationship within clusters (i.e., of embryos from the same mother) into account. One issue with GEEs is that an assumption about the nature of the correlations within clusters is required. In our study we look at results from ordinary logistic regression as well as results from three different GEE correlation assumptions: independent, exchangeable, and unstructured. Preliminary results suggest that in the freezing position problem, the traditional logistic, independent GEE, and the exchangeable-correlation GEE methods will reach the same overall conclusion (no freezing position effect), but that the unstructured GEE option will lead to the opposite conclusion.

SYNTHESIS AND CHARACTERIZATION OF A COVALENTLY LINKED POROUS POLY(BORONATE) NETWORK

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Monomers that self-assemble into their polymeric forms are a simple and effective means by which to obtain networks which possess a high degree of order at the molecular level. Boronic acids and diols can undergo a reversible condensation, resulting in a boronate ester linkage. This reversible boronate ester linkage allows polyboronic acids and bis-diols to self-assemble into highly ordered and covalently linked networks. Typically, self-assembled systems are bound through noncovalent interactions, such as hydrogen bonding or metal-ligand interactions. These poly(boronate)s offer the advantages of self-assembled materials, as well as the robustness of a covalently bound system.

AN OPINION COLUMN, ANGER, RESENTMENT AND THE FIRST AMENDMENT: A CASE STUDY IN FREEDOM OF THE PRESS AT WINTHROP UNIVERSITY

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When a copy editor for the award winning student newspaper at Winthrop University wrote in an opinion commentary column that she thought African-American students should get past their skin color and earn their wings in 2005 just like everyone else, she hit a tender nerve with this historically white university's 28 percent minority enrollent. About 400 students at Winthrop held a rally a few days after publication of her controversial column wanting to know why she had written what she did, why the student editor-in-chief had allowed the column to be published and wondering what they (the insulted, hurt African-American students) could do to make sure that the student newspaper could be more racially sensitive. Some students called for the resignation of the student editor-in-chief—even after the opinion column writer dropped out of school—and others threatened an advertising boycott of the student newspaper. This research presentation looks at steps taken by the student newspaper and the campus community in the wake of a First Amendment controversy that made statewide

and national news (44,000 hits on google in November 2005). What lessons were learned by the student newspaper, its staff and the faculty adviser to the newspaper? My presentation will focus on these lessons.

PREPUBERAL EXPRESSION OF GONADOTROPINS IN MICE

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Follicle-stimulating hormone (FSH) is a glycoprotein secreted from the anterior pituitary. Like other glycoproteins, FSH exists as a mixture of isoforms that vary in the number and type of sugar groups. Observed changes in FSH isoforms during critical reproductive events, such as puberty onset, suggest that different combinations of FSH isoforms influence reproduction differently. It has also been suggested that all FSH isoforms may not equally bind to antibody based assays. In order to establish a working model, a study was performed using pre-pubertal mice to determine at what age glycoprotein mRNA expression begins. Thirty- and sixty-day-old mice were sacrificed and glycoprotein expression was determined for alpha, FSH-beta, LH-beta, and TSH-beta subunits. Expression of each of the glycoprotein subunits was observed for both age groups. These data indicate that glycoprotein expression begins very early during growth and development. However, despite the expression of mRNA, morphological studies do not reflect that an "active" form of FSH is initiating gonad development or gametogenesis.

SYNTHESIS OF PLANT VIRUSES-BASED COMPOSITE MATERIALS

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The generation of nanomaterials with hierarchical ordered structure is the basis for the development of novel optical, electronic, acoustic and magnetic materials. Bionanoparticles including virus and viral like particles, ferritins, and other self-assembled protein cages are highly ordered nano-scale biological structures generated by nature. Compared with the inorganic nanoparticles, the uniform shape and size of viruses provide highly promising possibilities in self-assembly study for the construction of nanoscale materials with hierarchical structure. Mesoporous silica has attracted much attention for their potential applications in adsorption, sensors, catalysis, drug delivery, nanoreactors, and biotechnologies. The well controlled pore structure is the key factor for their applications. The objective of this work is to use virus nanoparticles combine with silica sol-gel process to generate virus/silica composites and correspondingly mesoporous silica with different pore size and different pore type. As shown in figure 1, both spherical virus nanoparticles including TYMV, ferritin and rod-like TMV will be used as the template to synthesis the virus/silica composite materials. After calcination, spherical or channel-like porous silica will be obtained accordingly. For rod-like TMV as the template, Cd2+ can direct TMV assemble to form ordered structure embedded in the silica which is an easy way to get gram products with well arranged ordered channel.

CHEMICAL ANALYSIS OF PIGMENTED SCLERITES FROM DISEASED CORAL SEA FANS

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Aspergillosis of coral sea fans (genus *Gorgonia*) is an infectious fungal disease caused by the pathogen *Aspergillus sydowii*. This disease is a major contributor to the widespread decline in coral sea fan populations. It has been observed that there is an increase in the population of darkly pigmented sclerites (carbonate skeletal components found within the gorgonian tissues) for diseased sea fans, which may suggest an increase in production of antifungal chemicals by the sea fan. To date, the chemical composition of the dark pigment contained within a given sclerite is unknown. Chemical analysis of the dark pigment present in the sclerites utilizing vibrational spectroscopy (IR and Raman), mass spectrometry, and separation techniques will be presented and discussed. Specifically, the analysis involves the use of acid digestion for the extraction of the pigment from the carbonate-based sclerite. By determining the chemical composition of the darkly pigmented sclerites, host disease resistance, pathogen virulence, and the sea fan-fungus pathosystem can be better investigated.

MODIFIED PREPARATIONS OF PHENYL HYDRAZINECARBOXYLATE AND CARBOPHENOXYHYDRAZONES, AND THE MULTIPLE ANION SYNTHESIS OF DIHYDROPYRAZOLINONES.

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Phenyl hydrazinecarboxylate was prepared in improved yield by minor revision of a procedure involving the condensation of equal molar amounts of hydrazine with phenyl carbonate. It involved adding of a mixture of hydrazine hydrate and methylene chloride to a cooled solution of phenyl carbonate in methylene chloride instead of combining cooled reactants and solvent together. The yields increased from 60-70 % to 85-95%. This compound was condensed with a variety of ketones by another procedural modification to give improved yields of carbophenoxyhydrazones. Formerly, the products were reported in 50-55% yield and resulted from heating under reflux for four hours equal molar amounts of ketones and phenyl hydrazinecarboxylate, all dissolved in ethanol. Two products resulted; the desired carbophenoxyhydrazone and a considerable amount of a second compound resulting from further condensation of the targeted carbophenoxyhydrazone with additional phenyl hydrazinecarboxylate. The compounds required separation. The modification was to replace ethanol with lower boiling point methanol, adding a catalytic amount if acetic acid, and heating the resulting solution for approximately twenty minutes. Targeted products were free from the possible higher melting point contaminant and yields ranged from 70-90%. Dilithiation of several of these carbophenoxyhydrazones, followed by treatment of the dianion intermediates with esters or aldehydes, then acid, did not result in the originally projected pyrazoles or dihydropyrazoles. Substituted dihydropyrazolinones were isolated instead, which resulted from an intramolecular cyclization of the dianion. Many of the carbophenoxyhydrazones prepared are new, along a few dihydropyrazolinones. Both compound types have biological potential in agriculture.

RUSSIA'S RAILROADS: LESSONS FROM AMERICAN-PART 2 ECONOMIC DEVELOPMENT

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Russia's Railroads: Lessons From America, Part 2 identifies factors (considerations) that influenced economic development in Russia east of the Urals and in the U.S. west of the Mississippi River in the 20th century. Considerations in order of importance for the western United states are (1) transportation, (2)incentives to encourage settlement and economic development, (3)governance and development of local law, (4) technologies to develope resources, (5)educational opportunities, and (6) geography and weather. The above rankings are generalized over the entire 20th century and will differ at different points in time. With respect to Russia, factors in order of importance, also generalized over the 20th century, are: (1), (6), (2), (3), (4), and (5). Concluded is that U.S. and Russia rankings are tending toward confluence in the early part of the 21st century which suggests that Russia is looking toward economic development in the western United States as a model.

RELEVANCE OF AGE, SEX, AND ODOR ON THE FORAGING BEHAVIOR OF *MANDUCA SEXTA*

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Foraging behavior of nectarivorous hawkmoths involves short bouts of flower visitation, during which time, the animal is capable of imbibing large quantities of nectar in relation to body mass. We are interested in determining how odor cues, sex, and age impact volume uptake capabilities of hand-fed versus free-flying *Manduca sexta*. Starved moths of both sexes and from one to five days in age were hand-fed by manually clamping the wings and extending the proboscis into a 25% sucrose solution. The solution was weighed before and after each feeding session in order to obtain the total volume imbibed. Another cohort of moths were reserved for free-flying experiments. These animals were starved for three days, post-eclosion and consisted of both sexes. They were released individually into a flight cage containing mock flowers. The flowers contained ependorf tubes, into which a 25% sucrose solution was pipetted. As in the hand-feeding experiments, the solution was weighed before and after sessions to determine the total volume uptake. The trend in the data shows that hand-fed males imbibe more volume in the first day than females. Discrepancies between the sexes involving total volume uptake lessen by the third day.

TRICHLOROETHYLENE PLUME DEGRADATION PRODUCTS AND PATHWAYS WITHIN A STREAM HYPORHEIC ZONE

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In order to accurately predict rates of natural attenuation for contaminant plumes in wetlands ecosystems, it is vital to determine plume flow patterns, suitability of chemical and microbial conditions, and degradation rate seasonality. CMP Pits, a waste disposal area at Savannah River Site, were in operation from 1971 until 1979 when they were closed and backfilled. However, monitoring well sampling indicated that trichloroethylene (TCE) had seeped beneath the vadose zone and formed groundwater

plumes with some contaminants reaching Pen Branch in the valley below. Although hot spots of TCE were found within the Pen Branch floodplain, it was unknown just how the flow pattern was entering Pen Branch and to what degree natural attenuation was destroying the contaminant load. Our study is addressing these questions for the critical hyporheic zone beneath Pen Branch to determine the relative breakdown of TCE into dichloroethylene (DCE) and vinyl chloride (VC). Seven stations were located by GPS along the channel of Pen Branch and positioned to intersect the modeled borders of the TCE plume flowing from beneath the old CMP Pits. At each of these stations 3 augered holes were located on the plume-side (holes 1-3) of the stream channel and three stations were located along the opposite side of the channel (holes 4-6). Stream water was kept out of the holes by first driving PVC pipes into the bottom and pumping them dry. These two sets of three stations were designed to provide a comparison of the relative groundwater inflows from opposite watershed slopes. In theory holes 4-6 should represent inflows of relatively uncontaminated groundwater compared to the inflows from the slopes draining CMP Pits. Water chemistry variables were measured polarographically (by Hydrolab and Orion pH meter) and included: temperature, pH, redox, conductivity, and dissolved oxygen. Fe+2, SO4, NH3, and H2S measurements were conducted with an optical colorimeter or color reference using Hach field kits. A complex entry pattern for TCE plume flows was detected beneath the Pen Branch streambed. Natural attenuation was documented by the presence of both DCE and VC. However, a notable difference for these holes was the occurrence of 1,1-DCE which is typically uncommon compared to the breakdown products of cis and trans 1,2-DCE. A distinctive microbial pathway may be operating here and upcoming DNA analyses will help to better clarify this unexpected occurrence of 1,1 DCE. *Supported under DOE/ SRS Cooperative Agreement DE-FC09-88SR418049

CHARACTERIZATION OF AEROSOLIZED BACTERIA FROM AFRICAN DUST

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Dust clouds originating from Africa transport tons of airborne soil to the Caribbean and Americas each year. Many pathogenic microorganisms including bacteria, viruses, and fungi are transmitted through airborne transport and disease outbreaks have been associated with dust storm activity. It has been hypothesized that pathogens may be transported across the Atlantic by these dust storms each year. There is also concern that naturally occurring airborne microorganisms from similar dust events could cause false alarms in environmental biodetection systems including the BioWatch program. These systems are designed to monitor potential aerosol release of biological pathogens. For this project isolated bacteria from air samples collected by the United States Geological Survey (USGS) were characterized by several methods of identification. The Sherlock Microbial Identification System (fatty acid composition profiling), 16S rRNA gene sequencing and the Microlog Biolog System (carbon substrate assay) were used to analyze the isolates. Antimicrobial susceptibility testing, growth temperatures, REP-PCR and biochemical test were used to further characterize the isolates. Results of 16s rRNA analysis identified over half the isolates as strains of Bacillus (Bacillus cereus, Bacillus subtilus and Bacillus licheniformis). Other isolates were tentatively named Staphylococcus kloosii and Microbacterium arborescens. An isolate identified by the Biolog System as Tsukamurella ichonensis was resistant to ten antibiotics tested, including vancomycin. The isolate identified as Bacillus cereus was resistant to six of the antibiotics tested. Assessment of the impact of these airborne bioaerosols on the

environment expands our understanding of the overall fate of the microorganisms and their potential long-term effects as potential pathogens.

CHARACTERIZATION OF THE RETROVIRAL VECTOR PLNPOLIX

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Since its discovery in 1982 the Acquired Immunodeficiency Syndrome (AIDS) has caused an estimated 529,113 deaths in the United States. The etiological agent of AIDS is the Human Immunodeficiency Virus (HIV-1) that primarily infects CD4+ T lymphocytes: the loss which leads to AIDS. Ribozymes have been studied as a possible way to target and inhibit HIV in infected cells. Hammerhead ribozymes are small catalytic RNAs that cleave substrate RNAs in a sequence specific manner. The HIV-1 genome encodes several proteins that may be good targets for ribozyme studies. One of these, Tat, encodes a small regulatory protein responsible for increasing transcription from the HIV promoter. We have previously generated a library of hammerhead ribozymes targeted to three alternate tat mRNA sites. Each of these ribozymes was shown to cleave tat RNA in in vitro cleavage assays. One of these ribozymes, targeted to nucleotide 5910 of the HIV-1 tat open reading frame showed the greatest activity in these assays. In order to test the activity of Tat5910 ribozyme in vivo, a retroviral vector suitable for expressing ribozymes was created. The retroviral vector pLNCX was modified by replacing the CMV promoter with the murine RNA polymerase I transcriptional cassette to create pLNPolIX. To determine the ability of this vector to generate retroviral particles, 293T cells were cotransfected with pLNPolIX and pPack-VSV-G. Virus particles harvested from this culture were used to transduce HeLa cells followed by selection with G418. The generation of stable clones indicated that the vector functioned as a retrovirus. In order to test expression from the RNA polymerase I cassette, the Tat5910 ribozyme was subcloned into pLNPolIX by sticky end ligation. Current studies are underway to characterize this vectors ability to express Tat5910 ribozyme in a eukaryotic cellular model. Supported by NIH AREA Grant: 1 R15 GM66689-01

GRANULOCYTE COLONY STIMULATING FACTOR (G-CSF) TREATMENT ALTERS BIOMECHANICAL PROPERTIES OF CRANIUM AND FEMUR IN C57BL/6 MICE

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The effect of granulocyte colony stimulating factor (G-CSF) on the strength of the femur and cranium in C57BL/6 mice was investigated. Ten C57BL/6 mice at 22 weeks of age were injected with saline (Group A). Another nine C57BL/6 mice also at 22 weeks of age were injected with G-CSF (Group B). Four weeks later, cranium and femurs were harvested. Tensile test and three-point-bend tests were performed until fracture. The load-displacement curve was recorded during the test. From the curve, linear elastic region was identified and the stiffness and the Young's modulus of the bone were then determined. The fracture strength, fracture energy, and the total energy to break the crania and the femur were determined as well. The test data show that mice treated with G-CSF have significant lower modulus in their crania and femurs when compared to the mice treated with saline. However, the test data of stiffness and Young's modulus

show slightly opposite trend. How G-CSF treatment achieves alterations in skeletal strength may be important in the overall understanding of homeostasis of skeletal tissue biomechanics.

HORSE SPLEEN FERRITIN AS BUILDING BLOCK FOR CHEMOSELECTIVE MODIFICATION AND SELF-ASSEMBLY

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Ferritin and apoferritin have been employed as nanoscale building blocks for new materials development. In this work, we investigate the chemo- and regio-selective modification of ferritin and apoferritin. In particular, succinimide derivatives are used to modify the lysine groups; and amine derivatives are used to conjugate on carboxylic acid residues on the surface of ferritin and apoferritin. MALDI-TOF analysis and proteomics methods are used to identify the reactivity and selectivity of the reactions. Furthermore, alkyne and azide groups have been attached on the surface of ferritin, which can be further derivatized by copper (I) mediated 1, 3-dipolar cycloaddition reactions. Therefore, ferritin and apoferritin can be considered as robust building blocks for chemical modifications. The functionalized ferritins have been further used in self-assembly studies. For example, polyethylene oxide (PEO) tailored ferritin has been applied in the co-assembly study with diblocks copolymers.

END

South Carolina Academy of Science
2006 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 & SCJAS Trust Fund
* 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
SCAS Soap Box Derby
* SCJAS Annual Report of Activities
SCJAS Topical Session Winners
SCJAS Special Award Winners

* Denotes a report included in this section.
Reports lacking a * indicate a report that was not received in time for inclusion in the 2006 Bulletin

President's Report
James E. Privett, President

The 2007 South Carolina Academy of Science and South Carolina Junior Academy of Science Annual Meeting will be held April 13th, 2007 at Midlands Technical College.

The South Carolina Academy of Science was organized in 1924 and is dedicated to raising the level of science education in South Carolina by enhancing research and the transmission of knowledge within the State. The 78th Meeting of the South Carolina Academy of Science was held at Winthrop University, March 15-16, 2005. A total of one hundred thirty oral presentations and posters were presented. Academy members from twenty five different institutions of higher learning participated in the meeting. Also one hundred thirty public school students representing ten schools gave oral presentations. Rudy Mancke, a highly respected South Carolina Naturalist, gave the keynote address during the plenary session. Officers, Council members, and members of the Academy are to be congratulated for a successful year in promoting the goals and mission of our academy.

Funding for Academy activities depends upon many sources including 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, Atotech, ATS Carolina, the Milliken Foundation, Winthrop University, the Carolina-Piedmont Section of the American Chemical Society and the University of South Carolina Sumter for their support of the Academy and the 2005 Annual Meeting.

There is a core of individuals who volunteer year after year to make the South Carolina Academy of Science and the South Carolina Junior Academy of Science outstanding organizations. As President, I would like to thank the Officers of the organizations, 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.

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

Dr. Hanno zur Loye has organized an outstanding Annual Meeting this year at University of South Carolina Columbia. The Academy appreciates the efforts of Dr. zur Loye and the 2006 Meeting Committee at USC Columbia for planning and hosting the 2006 Annual Meeting. This meeting will highlight Nanoscience and Nanotechnology and for the first time a session will cover research in these areas.

Report of the Secretary

South Carolina Academy of Science
Council Meeting
Minutes of meeting held January 14, 2005 at McCutchen House, USC Columbia.

Meeting opened by David Stroup at 2.12pm

Present: David Stroup, Dwight Camper, Hans-Conrad zur Loye, Bill Pirkle, James Privett, Peter King, John Safko, Karen Fox, Don Jordan, Radman Ali, John Baynes, Sharon Gilman, Cassandra Runyon, Karin Beaty, Jane Ellis, John Inman, David Ferris Rukiya Hite, Anthony Kurlychek

Minutes of the last meeting were presented.
Motion to accept the minutes as presented. Proposed by Dwight Camper
Seconded by Hans-Conrad zur Loye
Carried

Don Jordan thanked Rukiya Hite for her excellent service to the SCAS and introduced her replacement Anthony Kurlychek

Reports from Officers
President's report -
Dave Stroup reported that he has asked the Governor Sanford to present the Governor's Award at the Winthrop meeting but to date has no reply. Requested that each councilor forward information re contacts for fundraising and patron membership.
Immediate Past President's report - Dwight Camper added to comments of David Stroup by urging councilors to promote the senior academy activities on their campuses
Past President's report - Bill Pirkle concurred with need to promote SCAS at all SC colleges and suggested a poster be produced.
President Elect and Program Chair's report - Jim Privett presented a preliminary schedule of the annual meeting at Winthrop. Deadline for submission of abstracts is to be extended until Jan 25. A section for Engineering is to be added.
Vice President's report -
Hans-Conrad zur Loye reported that USC now has a Dean and the date of Friday March 10 2006 seems the likely time for the meeting. There was discussion on trying to have a later date and this will be investigated.
Secretary's report - Received some suggested changes for the Manual of Procedures from David Stroup.
Treasurer's report - Requested invoice from SCJAS. No details (too early) about registration for annual meeting available.

Reports from Standing Committees
Bulletin Advisory Committee - David Ferris reported that the bulletin is yet to be compiled. Final deadline for information is Feb 6. Journal that was to be published in October still not ready due to delay from reviewers. Delay not a problem for agreement with Gale publishing.
Governor's Award -Thirteen submissions have been received for the 3 awards.
High School Research Award - No funds have been requested to date this year.

Necrology - Nothing to report
Membership - No report
Patron Membership - Councilors are requested to approach their institutional officers to ensure patron membership.
Newsletter - No report.
Nominations and Elections - Dwight Camper is looking for nominations for 3 councilors, vice-president and secretary for the next election in March. To date just 2 nominees for councilor have been received.
Publicity - John Inman presented a plan for a publicity campaign. It was suggested that SCAS produce and send out press releases.
Resolutions - No report.
Science Fairs - It is possible that the International Science Fair will come to South Carolina in 2012. Suggested looking into a joint meeting with NCAS in Charlotte. Current details are posted on the website
Secondary Science/Mathematics Teacher of the Year - No report
Undergraduate Research Awards - Bill Pirkle reported that only Charleston and Clemson Sigma Xi chapters are giving funds for these awards. Requested $500 from SCAS to fund awards.
Motion: Undergraduate awards committee requests that SCAS allocate $500 for undergraduate awards at the 2005 annual meeting. Proposed by Bill Pirkle, Seconded by Dwight Camper
Carried
It was suggested that we approach other societies for awards in their field. Volunteers are still being sought to judge undergraduates at the Winthrop meeting.

Other Reports
SCJAS - Karen Fox reported that the fall workshop at Clemson very successful with 2 new schools participating. Next workshop at Heathwood Hall Episcopal High School. $1000 grant received from AAAS. Five students from 3 high schools going to the AAAS meeting in Washington DC. Request for more universities to host workshops.
MESAS - Don Jordan reported that Math/Science contest organized by the College of Charleston was very successful. 2000 sent out to schools.
Sigma Xi Graduate Research Awards - No report.
Two-year Colleges - No report
NAAS representatives - Representatives from 120 high schools expected in Washington DC. Efforts are being made to get more state academies involved in high schools.

New Business
David Ferris suggested a public statement be made supporting the teaching of evolution in schools. Some discussion on whether this was necessary. David Ferris is to circulate information by email regarding a move in the state legislature to oppose teaching of evolution in schools by email.
John Baynes suggested an increased effort to recruit more minority council members. Discussion on possible new activities for SCJAS. Request for this topic be put on the agenda for the next meeting.

Meeting closed at 4.10 p.m.

South Carolina Academy of Science
Council Meeting
Minutes of meeting held March 15, 2005 at Baruch Room, Joynes Conference Center, Winthrop University.

Meeting opened by David Stroup at 7.25 pm
Present: David Stroup, Dwight Camper, Hans-Conrad zur Loye, James Privett, Peter King, John Safko, Karen Fox, Don Jordan, Radman Ali, John Baynes, Karin Beaty, Jane Ellis, Peter Fichte, David Ferris, Rukiya Hite, Anthony Kurlychek

Minutes of the last meeting were presented.
Motion To accept the minutes as presented proposed by John Safko, seconded by Dwight Camper
Carried

Reports from Officers
President's report - Dave Stroup welcomed all present and thanked Winthrop University and USC Sumter for working on the annual meeting. Offered a special welcome to D. Stone.
This being his last meeting as president he thanked Anthony Kurlychek and all officers for their assistance.
Funding for the meeting has been provided for Roche Carolina, Atotech, Michelin NA, Mead Westvaco, Bowater, ATS Carolina, American Chemical Society, Winthrop University and USC Sumter.
Extra publicity was provided by interviews on Speaking with Schools on NPR.
A package is being prepared for potential donors to the Trust Fund. Target is $6 million.
Patron membership is lagging. Please speak to administrators at your particular institution.
Immediate Past President's report - Dwight Camper added to comments of David Stroup by urging councilors to promote the senior academy activities on their campuses. Thanked the current president for his efforts this year.
Past President's report - No report.
President Elect and Program Chair's report - Jim Privett thanked all those who assisted him with the organization of the annual meeting.
Vice President's report - Hans-Conrad zur Loye reported that no date has been set for the next annual meeting yet. Still considering a separate date for the SCJAS meeting.

Secretary's report - No report.

Treasurer's report - Tabled a written accounts summary. Presented list of 39 new members joining between 7-1-04 and 5-1-05. Motion to accept all members presented. Moved by J Privett. Seconded by D. Camper. Motion Carried
Currently about 300 financial members

Reports from Standing Committees
Bulletin Advisory Committee - David Ferris reported that the bulletin was received late from the printer but was sent March 10. Electronic submission of abstracts was successful. Thanked Bill Junkin, Jim Privett and Anthony Kurlychek for assistance. Journal was late because of delays receiving comments from reviewers.

Governor's Award - Thirteen submissions have been received for the 3 awards. Announced winners
Scientific Research – Dr. Frank Berger, USC Columbia
Scientific Awareness – Dr. Gabriel Virella, MUSC, Dr. Jerry Reeves, Midlands TC
Young Scientist – Dr. Ya-Ping Sun, Clemson University
Motion that joint awardees of Scientific Awareness award both receive full amount of award ($1000).
Proposed by Karen Fox, Seconded by Jane Ellis, Carried
Date for ceremony in Governor's office not yet decided.
High School Research Award - No report
Necrology - No report
Membership - See treasurer's report
Patron Membership - Councilors are requested to approach their institutional officers to ensure patron membership.
Newsletter - No report.
Nominations and Elections - There are 8 candidates for council positions. Voting procedures have changed and it will be via the website and will be extended for 30 days after the annual meeting. Suggest sending an email and postcard to each member to encourage them to vote.
Publicity - No report.
Resolutions - No report.
Science Fairs - National Science fair to be held in Phoenix May 8-14.
Fred Clayton retiring after many years service to the Sand Hills region. Gill Fairbanks and Tom Roop have also given many years of service.
Motion to give a service award to all three from the SCAS. Proposed by Dwight Camper. Seconded by John Safko. Carried
Secondary Science/Mathematics Teacher of the Year - Award will be funded by BMW. $500 plus trip to AAAS annual meeting.
Undergraduate Research Awards - Bill Pirkle has it all organized.

Other Reports
SCJAS - 119 oral presentations accepted for the annual meeting from 9 schools. 238 people registered for the meeting. The Governors School and Spring Valley are the largest contributors.
This year 2 workshops at Clemson and Heathwood Hall Episcopal School.
Next year workshops planned for Coker College and Spring Valley High School

MESAS - February 12 meeting at USC well attended. Mary Whaley is the current Low Country MESAS Director.
MESAS contest has been delivered to SCAS main office and is about to be graded. Very successful contest designed by College of Charleston. A record number of 656 entries were received from middle school students.
Sigma Xi Graduate Research Awards - No report.
Two-year Colleges - No report
AAAS - Don Jordan and John Safko attended meeting in Washington DC. Don Jordan reports that there is still a push for metrics education.
Science Development - Val Dunham reported that SCAS needs more exposure to scientific community.
In consultation with Scott Little of EPSCoR, Val Dunham suggested SCAS be more involved with science initiatives in the state e.g. development of biotechnology.

New Business - John Safko concerned about the SC education subcommittee introducing legislation to redefine science and effect science education in K-12. He suggests we all be aware of the situation to see if it goes any further than the sub committee.

Meeting closed at 9.16 p.m.

South Carolina Academy of Science
Business Meeting
Minutes of meeting held March 16, 2005 at Winthrop University.

Meeting opened by David Stroup at 12.29 p.m.

Report from the President - David Stroup summarized a written report printed in the Bulletin. He thanked Winthrop University for hosting the 1995 meeting and particularly Dr. Chasta Parker for her in organizing the meeting with Dr. Jim Privett.
David Stroup explained the changes to the procedure for electing officers of SCAS. Votes will be cast via the SCAS website. Voting will be open from March 18 for 30 days. Each financial member will receive an email and a postcard informing them of the changes and encouraging them to vote. It is hoped that this change will result in greater participation in the process by members
The 2005 annual meeting had 130 oral presentations and 30 posters.
A written report from the treasurer is in the bulletin. This year SCAS has more corporate sponsors than in previous years. This year SCAS has started a fund raising campaign with the aim of establishing a $6,000,000 trust fund.

New Business
A member raised the point that the new Governor's Young Scientist Award for Excellence in Scientific Research was awarded to a scientist with more than 10 years experience, contrary to circulated criteria for the award. It was expressed that this was no way to encourage young scientist and had upset many people who had gone to the trouble of nominating eligible young scientists.
The meeting suggested that the Governors Award committee should look into the process and define the terms of the award more clearly.

A motion was proposed that the criteria for the Governor's Awards be clearly defined and adhered to, and applications sought by distribution of the information to all universities and colleges in the state.
Proposed by Rich Heindrich, Seconded by Hans-Conrad zur Loye, Carried

Meeting closed at 1.05 p.m.

South Carolina Academy of Science
Council Meeting
Minutes of meeting held Friday, July 8th, 2005 at McCutchen House, USC Columbia.

Meeting opened by David Stroup at 2:09 PM.
Present: Bill Pirkle, Karin Beaty, Hans zur Loye, David Stroup, James Privett, Thomas Reeves, Karen Fox, Radman Ali, George Shiflet, Peter Fichte, Alvin Fox, Sharon Gilman, Anthony Kurlychek

2:13 PM – List of Council Officers is circulated.
Minutes of last meeting are presented. Motion To accept minutes as presented. Proposed by Karen Fox Seconded by Hans zur Loye, Carried

2:18 PM – **Reports from Officers**
President's Report- SCAS Newsletter is going to press – it will be 20 pages long
Handing out of service awards to Drs. Safko and Roop. Neither was present so it was decided to give the awards to them at next meeting in October. Passing of the gavel to Dr. Privett.
Immediate Past President's report - Dr. Camper was absent
Past President's Report - 2:24 PM – Undergraduate report – looking for sponsors, and discussion of judging arrangement possibilities, especially in cross discipline categories.
EPSCOR awards – Invite Scott Little to the next SCAS Meeting in October.
President Elect's Report - 2:49 PM – Summary of 2005 Annual meeting at Winthrop University will be in SCAS Newsletter.
Circulation of a proposed deadlines sheet – switched date of Call for Papers deadline to 10/15/05.
Switched deadline for On-line abstracts to 1/11/06.
Vice President's Report - 2:51 PM – Plans for 2006 Annual meeting are going well – date is set for March 10, 2006.
Thomas Reeves has plans started for 2007 Annual meeting.
Secretary's Report - 3:01 PM – Jane Ellis was absent. Circulation of SCAS Manual of Procedures.
Treasurer's report - 3:03 PM – John Safko was absent. Circulation of proposed SCAS Budget for 2005-06.

Reports From Standing Committees
Governor's Award - 3:04 PM – Decided on establishing a 12 year maximum for candidates from the time of their PhD.
No date set for this year's (2005) presentation yet.
Bulletin - 3:06 PM – Distributed Bulletin and Journal Report. (David Ferris was not present)Discussion of bulletin mail-out. (Planned for before the Annual Meeting).
Long Range Planning - 3:09 PM – Discussion on Val Dunham and EPSCOR to include EPSCOR students in the SCAS Annual Meeting. Share information between the SCAS and EPSCOR web sites.
Membership - 3:15 PM – Patron membership should be discussed with the provost. Fees for the Annual Meeting 2005 were fully funded.
Newsletter - 3:17 PM – Discussion whether to put Newsletter online and a comparison of mailing hard copies versus the online version. Discussed adding to Membership Registration the option of selecting the receipt of a hard copy, online copy, or both versions of the Newsletter.
Publicity - 3:25 PM – John Inman was absent. John Inman has increased publicity. (Dr. Stroup's radio interview)
Winthrop Public Relations went to the newspapers. Jane Ellis is to supply Anthony Kurlychek with awards information for the SCAS web site.
Science Fairs - 3:31 PM – Don Jordan was not present. Anthony Kurlychek provided summary of 2005 Region II science fair. MESAS Contest and Workshop summaries circulated. Help requested by Anthony Kurlychek in creating an on-line registration page. Discussion regarding how to split into one's own science fair region.

Teacher of the Year - 3:38 PM – Tom Roop was not present. 2005 TOY was Marlene Albright. Should it become mandatory that the TOY be involved with MESAS and other science organizations? Discussion of the criteria for selecting TOY. Discussed re-establishing a criteria form, as well as Anthony Kurlychek will research past criteria forms through Tom Roop.
Discussion of any publication options for undergraduate students.

Other Reports
Trust Fund - 3:52 PM – John Safko was not present, but he submitted a request to change SCAS fiscal year to selected dates of his choice.
Motion
By Karen Fox to allow John Safko to select the dates himself. Seconded by Radman Ali. Carried by unanimous vote.

SCJAS Report - 3:55 PM – The SCJAS Winter Workshop will be at Hope College.
There is no 2006 SCJAS Budget yet.
SCJAS lost some money in 2005.

Old Business
Online voting
4:10 PM – Plan to return to it on 2006.
Recognition of retired science fair directors.

New Business
4:13 PM – Peter Fichte mentioned the SCJAS Fall workshop is looking for funding from the SCAS for a guest speaker.
Motion: to have SCAS President discuss this with John Safko.
Seconded by Hans zur Loye.
Discussion
Should there be a limit on how much SCAS should give?
Amended Motion to put a limit on funding to no more than $500.
Motion carried unanimously.

4:27 PM – Alvin Fox introduced whether EPSCOR grants should be given to graduate as well as undergraduate students and whether they were obligated to present their results.

John Baynes submitted a request through Anthony Kurlychek to include black and minority colleges in the SCAS.

Meeting closed at 4:40 PM.

South Carolina Academy of Science
Council Meeting
Minutes of meeting held October 28, 2005 at McCutchen House, USC Columbia.

The Meeting was called to order by President Jim Privett at 2:20 p.m. Present: Jim Privett, Dwight Camper, Hans-Conrad zur Loye, Tom Reeves, John Safko, Alvin Fox, Don Jordan, John Baynes, Sharon Gilman, Jane Ellis, John Inman, David Ferris, Tom Roop, Anthony Kurlychek

Guests: Scott Little (EPSCoR), Patsy J. Earnhardt (Director AOP Regional Science Fair)

President Jim Privett passed out the agenda and committee assignments. John Safko and Don Jordan were appointed SCAS AAAS representatives. Minutes of the last meeting were presented. Motion was made to accept the minutes as presented. Proposed by John Safko and seconded by Dwight Camper. Approved amended with the moving of the Trust Fund report from Other Reports to New Business.

Reports from Officers

President's Report - Jim Privett reported the Long Range Planning Committee approved $15.00 for the Annual Meeting preregistration and $20.00 onsite. The newsletter will be sent out via email announcement directing all to the SCAS website. Members requesting printed newsletters will be mailed copies. A new treasurer is needed for SCJAS because Jerry Howe wants to retire before the Annual Meeting. Jerry was commended for a job well done. The LRPC recommended approval of the AOP Science Fair's inclusion.

Immediate Past President's Report - Jim Privett reported for Dave Stroup who was absent. Dave is presently soliciting funds for the Academy and working on updating the SCAS database.

Past President's Report - Dwight Camper stated we needed to raise awareness of the Academy in the state. Ideas were discussed as to how to get more publicity.

President Elect and Program Chair's Report - Hans-Conrad zur Loye stated that the Annual Meeting plans are on track. He is raising money for expenses and writing the invitation for the newsletter. The meeting will be held on March 10, 2005 (during USC's Spring Break). The council meeting will be held the night before on March 9.

Vice President's Report - Tom Reeves announced the 2007 Annual Meeting would be held at Midlands Tech either on April 6 or April 13, 2007.

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 $121,610,61 in the SCAS account, $95,000 from the state EIA Funds (primarily for SCJAS and MESAS). John placed $60,000 in a 6 month CD at 4% interest rate. Dues have been paid for 151 members through July 2006. John reminded us that the SCAS fiscal year now runs from August 1 to July 31. This was approved at the last council meeting.

Motion: John Safko moved we approve the budget for this year. Hans-Conrad zur Loye seconded. The budget was approved.

Reports from Standing Committees

Bulletin Advisory Committee - David Ferris reported abstracts are due January 11 and the Bulletin will be mailed out before March 1, 2006. The Journal should be out in November. David stated he had go**o**d responses in obtaining reviewers.

Governor's Award - Don Jordan noted the Governor's Award nominations had been mailed out. December 9 is the deadline for receiving nominations. He is planning to add 3 industry representatives on the committee. Discussion ensued concerning criteria for the junior scientist award. The president appointed Alvin Fox and Hans-Conrad zur Loye to work on this for 2006-2007.

Newsletter - See information in President's Report. Mike Farmer was not present.

Nominations and Elections - No report. Dave Stroup was not present.
Program - See President-Elect's report.
Secondary Science/Mathematics Teacher of the Year - Tom Roop discussed the TOY committee structure and nomination forms were given out. Ways to disseminate TOY information were discussed. Tom proposed the nomination form be revised and a master teacher be added to the list of committee members. This was approved by the council.

Other Reports
MESAS - Don Jordan distributed information on the MESAS workshops (Midlands, Low Country, and Western Regions) and Science and Engineering Fairs. He also reported on the winners of the Young Scientists' competition.

Reports not given at this meeting will be presented at the next meeting on January 27, 2006.
Meeting adjourned at 4:45 p.m.

Respectfully submitted,
Jane P. Ellis

SCAS Treasurer's Report for 1 July 2003 through 30 June 2004

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

6/1/04 through 7/31/05

Category	6/1/04-7/31/05
Inflows	
AW-InvertebrateBio	250.00
Aw-misc-I	110.00
Bulletin-I	259.49
Council-I	177.33
Donations	263.00
Dues04-05	7,076.00
Dues05-06	227.00
Gaes-I	5,000.00
Interest	357.26
ISEF-I(04)	5,614.90
ISEF-I(05)	32,902.12
meet-in-05	3,678.00
MESAS-I	7.00
Scj-re-aw-I	1,000.00
Sigxiug-I	750.00
StateGrant	95,000.00
From Liquid Capital	1,848.05
Total Inflows	**154,520.15**
Outflows	
AJAS	5,837.95
Aw-misc-E	100.00
Bulletin-E	5,570.50
Council(awards)	181.38
Council-E	121.12
Gaes-E	5,167.04
ISEF-E(05)	42,631.15
Meet-ex-04	282.10
meet-ex-05	1,214.58
MESAS-E	12,360.48
metcer	619.20
NAAS-E	243.00
news-SCJAS	1,805.55
Newsletter	5,229.10
Office-Gen:	
equipment	129.98
General operations	738.16
Office supplies	3,928.51
Printing, prep, postage	3,099.83
Salary:	
fringe	2,424.69
GA supplement:	
bonus	250.00

Category Summary Report

6/1/04 through 7/31/05

continued

Category	6/1/04-7/31/05
GA supplement - Other	1,500.00
Total GA supplement	1,750.00
pay	8,640.72
Salary - Other	3,092.45
Total Salary	15,907.86
Travel	204.37
Office-Gen - Other	34,488.71
Total Office-Gen	58,497.42
Office-Treas:	
postage	200.00
supplies	157.74
Office-Treas - Other	119.04
Total Office-Treas	476.78
Postage	737.92
Postage2	1,100.88
Postage3	390.20
SCAS-Transfer	20,000.00
Scjas-E-post	1,278.25
Scjas-E-Print	2,208.72
SCJAS-Expenses	631.48
Sf	1,287.77
Sigxiug-E	1,670.60
Toy	126.01
Outflows - Other	0.00
To Postage	2,668.97
Total Outflows	**172,438.15**
Net Inflows/Outflows	**-17,918.00**

FINANCIAL STATEMENT
SOUTH CAROLINA JUNIOR ACADEMY OF SCIENCE
July 1, 2004 – June 30, 2005

BALANCE ON HAND 7/1/04			**$ 4,770.88**
(NBSC Checking Account)			
INCOME			
Interest		6.94	
Dues		1005.00	
Fall Workshop (Clemson)		1255.00	
Winter Workshop (Heathwood Hall)		1356.00	
Annual Meeting Registration Fees (Winthrop)		3698.00	
SC State Dept. of Education		5000.00	
Donations		900.00	
SC Energy Office		400.00	
TOTAL INCOME		13,620.04	
EXPENSES			
Fall Workshop (Clemson)		1400.10	
Winter Workshop (Heathwood Hall)		1450.98	
Annual Meeting (Winthrop)			
Food, lunch and awards banquet		2790.56	
Student Awards			
Certificates, Ribbons & Supplies (Annual Meeting)		242.75	
Monetary Awards for Research (Annual Meeting)		11905.00	
American Association of Physics Teachers Awards		200.00	
SC Energy Office Awards		400.00	
Fall Workshop			
Challenge Bowl and Speaking of Science		324.12	
Winter Workshop			
Science Olympics and Speaking of Science		633.33	
Travel Grants to Schools	(fall workshop)	810.00	
	(winter workshop)	475.00	
	(annual meeting)	1475.00	
Newsletters		0.00	
SCJAS Board Travel		206.04	
Executive Treasurer		173.84	
Executive Director		0.00	
TOTAL EXPENSES		22,486.72	
NET INCOME (DEFICIT)		(8,866.68)	
TRANSFER OF FUNDS FROM SCAS		20,000.00	
JUNIOR ACADEMY BALANCE 6/30/05			**$ 15,904.20**
(NBSC Checking Account)			
TRUST FUND BALANCE	**6/30/04**		**128,972.64**
	6/30/05		**131,533.76**

South Carolina Academy of Science
Legislative Funds Report 2005
By Don Jordan

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. In 1999, SCAS received funds to establish a central office to: 1) strengthen the eight regional science and engineering fairs; 2) to further develop existing regions of the Middle and Elementary School Academy of Science (MESAS, founded 1991) for 4-8th graders, and to establish regions in the Hilton Head, Spartanburg/Rock Hill and Aiken areas; 3) to introduce a K-3 pilot plan for the establishment of the Kindergarten/ Elementary School Academy of Science (KESAS); 4) to strengthen the Junior Academy of Science (SCJAS for grades 9-12) by including more rural schools and more scholarship opportunities; 5) to manage Discovery Fair (public awareness of science, math and engineering), an eleven day event of hands-on activities at the South Carolina State Fair which generally includes 25-30 middle and high schools sending students to help manage the booth; and 6) to complete the pilot CMS program with a final goal to certify one teacher in all of the 1,645 schools in the state (private and public) as Certified Metric Specialists.

For 2000, the amount was expanded to allow the hiring of one full-time office administrator who acts as Executive Assistant to Council.

USC, through the efforts of several Deans has provided offices, computers and office equipment as well as computer technical support for the office of the South Carolina Academy of Science. Without the support of USC it would not be possible for the Academy to expand its outreach efforts to the students of South Carolina. Senator Nikki Setzler (Lexington) and the late Senator Don Holland (Kershaw) played a vital role in the approval process of establishing funds for the South Carolina Academy of Science. The Academy expresses its gratitude to those in the legislature who gave their support to the Academy and sincere thanks to the membership and friends of SCAS who provided expert advice and leadership during the three year quest to obtain funds for SCAS.

UNDERGRADUATE RESEARCH AWARDS COMMITTEE

N. Dwight Camper, Chair

Undergraduate Research Competition: Winners at SCAS Meeting: March 2005

Chemistry - Meredith Tershansy Department of Chemistry and Biochemistry, University of South Carolina - Columbia: Solvothermal Synthesis, Structural Determination, and Thermochromic Behavior of Several New Mixed-Metal Bismuth Halide Compounds

Biochemistry - Kyle Strickland Department of Chemistry and Biochemistry, College of Charleston: Applications of Molecular Modeling to Drug Design

Field Biology - Amanda Walker Division of Natural Sciences and Engineering, University of South Carolina Upstate: Survey of Odor/Taste Producing Algae and Cynobacteria in Lake Blalock and Lake Bowen

Physics - Joshua Witthuhn Department of Physics and Astronomy, University of South Carolina - Columbia: Client-Server Data Acquisition Controller

Geography/Geology - Mark Creech Department of Physics and Astronomy, College of Charleston: Modeling Earthquake Fault Interactions Using IDL

Cellular Biology - Rachel Fuller Department of Biology, College of Charleston: Circadian Oscillations of Signaling Molecules in Mouse Peripheral Tissues

Molecular Biology - Travis Jenkins Department of Biology, College of Charleston: A Role for a PLC*B*4-mediated Signal Transduction Pathway in the Circadian Clock of the Mouse Brain

Astronomy - Sarah Sonnett Department of Physics and Astronomy, College of Charleston: A Tale of Two Stars: Analysis of Light Variations in Candidate Slowly Pulsating B and Gamma Doradus Variables

Judges: Appreciation is expressed to the following individuals who served as judges for the Undergraduate Research Awards Program. They were:

Walteena Simpson, Jim Payne, and Joe Emily, South Carolina State University; David Gangemi, Clemson University
Laura Glasscock and John Dille, Winthrop University
Jane Ellis, Presbyterian College
Jan Haldeman, Erskine College
John Riley, DSB Scientific Consulting
Chad Leverette and Stelios Kapranidis, University of South Carolina - Aiken
Judy Krueger, University of South Carolina - Upstate
Ed Sharp and David Tedeschi, University of South Carolina - Columbia
David Heffner, Advanced Environmental Solutions
Danny Faulkner, University of South Carolina - Lancaster.

Two-Year College CommitteeReport

NO 2005 REPORT RECEIVED

AAAS Student Research Grants Report

NO 2005 REPORT RECEIVED

Report of the National Association of Academies of Science (NAAS) Delegates

The annual meeting is held in conjunction with the American Association for the Advancement of Science (AAAS). The NAAS sponsors during this time the American Junior Academy of Science (AJAS) that brought together 130 high school delegates and their chaperones. These delegates are chosen by the 46 state and regional academies who are members of the NAAS. Each year, participating students give a poster presentation in conjunction with the AAAS, give oral presentations, attend some of the AAAS sessions, and have scientific tours. Since attendance is an honor, no judgment is made of the presentations and posters. AJAS also has a breakfast with the delegates and representatives from the science community attending the AAAS meeting. In 2005, South Carolina sent six student representatives to the AJAS.

The NAAS holds it annual business meeting and a workshop during this time. Don Jordan is one of the two NAAS members on the AAAS Council as well as doing the NAAS newsletter. John Safko is the NAAS treasurer.

The next meeting will have a joint session with representatives of the National Academy of Science (NAS) to discuss encouraging research at all levels.

John L. Safko and Don Jordan, Delegates to NAAS

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.

Web www.cosm.sc.edu/jordan

2005 MESAS MAIL-IN CONTEST SETS A RECORD NUMBER OF ENTRIES: 678 Winners

Announced May 2005

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 678 entries, with 514 students from grades 4-6 and 164 students from grades 6-8. This year, the contests proved to be especially challenging and covered a broad range of topics with emphasis on Geology. We are grateful to the College of Charleston for the creation of this year's contest. The authors of the 2005 contest are faculty and staff from the College of Charleston. They are: Dr. Cassandra J. Runyon, Department of Geology and SCAS Board Member, Dr. Betsy Martin, Department of Chemistry and Governor's Award Winner for Excellence in Science, Starr Jordan, Lowcountry Hall of Science and Math, and Lowcountry Science and Engineering Fair Director, and Kathryn Guimond, SERCH Program Manager and Education Specialist.

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 17 students from five regions who submitted the best overall papers. **Region I**: Patrick Bachanan of Westview Middle, John Isenhower and Jason Isenhower of Cambridge Academy, **Region II:** Tanner Werts of Pomaria Garmany Elementary, Afia Kahn of Lonnie B. Nelson, Matthew Kunkle of Mid Carolina Middle, Thomas Jones of Kimberly Jones Homeschool, Huzaifah Adnan and Hidayah Adnan of Islamic Academy of Columbia; **Region IV**: Brooke Kirkland of Palmetto Elementary and Stewart Bryant of Montessori School of Florence; **Region V:** Karen Mok & Geyson Kerley of Rollings Middle School of Arts, Nicole Stickley of Sangaree Intermediate and Jasmine Mack of St. Stephen Middle School and Jonathan Graham of JSJ Academy (Homeschool); And **Region VII** Adam Lipsitz of Mossy Oaks. The above list 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 207 winners out of 678 participants (approx 30% 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. Following this page is a list of the winners, their prize, as well as their sponsor and school information: The Academy would like to recognize this year's student graders for the SCAS MESAS mail-in Contest. They are: Zoe Coombs – 77 hours; Christine Chakides – 35 hours; Emily Hallmark – 33 hours; and Kelly Harvey – 15 hours. Special recognition goes to captain Zoe Coombs.

Grade	Winner	$ Amt	SCHOOL	Reg
GRAND PRIZE WINNERS				
5	John Isenhower	$100	Cambridge Academy	I
8	Jason Isenhower	$100	Cambridge Academy	I
?	Thomas Jones	$100	Homeschool of Kimberly Jones	II
7	Huzaifah Adnan	$100	Islamic Academy of Columbia	II
8	Hidayah Adnan	$100	Islamic Academy of Columbia	II
7	Jonathan Graham	$100	JSJ Academy (Homeschool)	V
5	Afia Kahn	$100	Lonnie B. Nelson	II
7	Matthew Kunkle	$100	Mid Carolina Middle	II
6	Stewart Bryant	$100	Montessori School of Florence	IV
4	Adam Lipsitz	$100	Mossy Oaks Elementary	VII
5	Brooke Kirkland	$100	Palmetto Elementary	IV
5	Tanner Werts	$100	Pomaria Garmany Elementary	II
8	Karen Mok	$100	Rollings Middle School of Arts	V
8	Greyson Kerley	$100	Rollings Middle School of Arts	V
5	Nicole Stickley	$100	Sangaree Intermediate	V
8	Jasmine Mack	$100	St. Stephen Middle School	V
6	Patrick Bachanan	$100	Westview Middle	I
STATE PRIZE WINNERS				
6	Taylor Richey	$75	Belton Middle	I
7	Lauren Shirley	$75	Belton Middle	I
7	Richard Dorn	$75	Belton Middle	I
7	Katalin Bartz	$75	Cambridge Academy	I
8	Kaleigh Wardlaw	$75	Camden Middle School	II
4	Jared Hipp	$75	Centerville Elementary	I
4	Carl Garris	$75	Chapin Elementary	II
6	Becca Evans	$75	Chereekee Trail Elementary	I
6	Marissa Rawski	$75	Chereekee Trail Elementary	I
8	Caitlin Orr	$75	Covenant Christain School	II
4	Grace Westbury	$75	Dorchester Academy	V
5	Morgan Godines	$75	Godines Academy	II
7	Austin Godines	$75	Godines Academy	II
6	Bushra Rahman	$75	Islamic Academy of Columbia	II
8	Stephanie Kohl	$75	Kohl Discovery School	V
4	Michael Brown	$75	McCormick Elementary	IV
8	Alan Brenner	$75	Mid Carolina Middle	II
6	Alexandra McKenzie	$75	Montessori School of Florence	IV
4	Jeremy Wu	$75	Nursery Road Elementary	II
4	Ryan Liner	$75	Port Royal Elementary	VII
2	Johathan Bartlett	$75	Renaissance Elem Academy	II
4	Benjamin Bartlett	$75	Renaissance Elem Academy	II
5	Ewa Buczulinska	$75	Richard Carrol ElemCampus B	II
5	Elizabeth Glenn	$75	Richard Carrol ElemCampus B	II
6	Eric Kan	$75	Riverside Middle	I
7	Alice Chang	$75	Rollings Middle School of Arts	V
7	Rowan Armstrong	$75	Rollings Middle School of Arts	V
8	Victor Imko	$75	Rollings Middle School of Arts	V
4	Jami Bunton	$75	St. Andrews School of Math & Sci	V
4	Kasey Chesser	$75	White Knoll Elementary	II
8	Bennet Bush	$75	Wright Middle	I

Grade	Winner	$ Amt	SCHOOL	Reg
REGIONAL PRIZE WINNERS				
5	Tyler Ray	$50	Andrews Elementary	IV
7	Daniel McDuffie	$50	Bates Middle	II
7	Zachary Wardlaw	$50	Belton Middle	I
7	Benjamin Thomas	$50	Belton Middle	I
7	Katherine Clinkscales	$50	Belton Middle	I
7	Hayden Jennings	$50	Belton Middle	I

Grade	Winner	$ Amt	SCHOOL	Reg
REGIONAL PRIZE WINNERS				
7	Luke McClain	$50	Belton Middle	I
7	Nicole Shannon	$50	Belton Middle	I
8	Trevor Richey	$50	Belton Middle	I
7	Katie Pruett	$50	Branchville High	II
6	Miranda Oxner	$50	Cambridge Academy	I
6	Ryan Gonzalez	$50	Cambridge Academy	I
8	Johnny Connare	$50	Camden Middle School	II
8	Jonathan Windham	$50	Camden Middle School	II
8	Joseph Stokes	$50	Camden Middle School	II
4	Emily Patterson	$50	Centerville Elementary	I
6	Rick Patterson	$50	Chereekee Trail Elementary	I
4	Darius Newman	$50	Crestview Elementary	I
5	Egan Barrs	$50	Crestview Elementary	I
8	Theta Brown	$50	Heyward Gibbes Middle	II
5	Sarah Fishburne	$50	Holly Springs Elementary	I
4	Elizabeth Anne Orr	$50	Home School	I
6	Thomas Orr	$50	Home School	I
6	Zachary Tarront	$50	Hunter Kinard Tyler Elementary	II
5	Tammaka Staley	$50	John P. Thomas	II
4	Sarah Graham	$50	JSJ Academy (Homeschool)	V
7	Travis Graham	$50	JV Martin Jr. High	IV
6	Calla Shepard	$50	Kelly Mill Middle	II
4	John Black	$50	Killian Elementary	II
6	Jessica Kohl	$50	Kohl Discovery School	V
5	Jacob Hoffman	$50	Lake Forest Elementary	I
5	Arjun Aggarwal	$50	Lexington Elementary	II
4	Daria Light	$50	Light Home School	V
5	Paul Williams	$50	Lockett Elementary	II
6	Kaitlin McClure	$50	Lockett Elementary	II
7	Christopher Frost	$50	Marrington Middle	V
8	Denicsha Bennamon	$50	Marrington Middle	V
4	Victoria Stokely	$50	McCormick Elementary	IV
4	Andrew Shealy	$50	Nursery Road Elementary	II
5	Tyahn Jenifer	$50	Palmetto Elementary	IV
5	Latesha Edge	$50	Palmetto Elementary	IV
5	Andrew Anderson	$50	Plain Elementary	I
5	Alex Stewart	$50	Plain Elementary	I
5	Joseph Brookbank	$50	Plain Elementary	I
5	Drew Ricard	$50	Pomaria Garmany Elementary	II
5	Elizabeth Nichols	$50	Pomaria Garmany Elementary	II
5	Cody Martinez	$50	Port Royal Elementary	VII
5	Brent Cook	$50	Richard Carrol Elem Campus B	II
5	Deanna Nowell	$50	Richard Winn Academy	II
6	Eric Kan	$50	Riverside Middle	I
6	Gray Sauer	$50	Rollings Middle School of Arts	V
7	Grace DeLuca	$50	Rollings Middle School of Arts	V
8	Laura Dixon	$50	Rollings Middle School of Arts	V
8	Alecia Coutain	$50	Rollings Middle School of Arts	V
8	Matt Carrow	$50	Rollings Middle School of Arts	V
6	Betsy Hodge	$50	Sangaree Middle	I
5	Michael Birch	$50	Varnville Elementary	VII
4	Wes Williams	$50	White Knoll Elementary	II
8	Brianna Noblin	$50	Wright Middle	I
8	Bryan Glace	$50	Wright Middle	I
Grade	**Winner**	**$ Amt**	**SCHOOL**	**Reg**
SCHOOL PRIZE WINNERS				
5	Trevor Cox	$25	Dacusville Elementary	I
5	Taylor Hawkins	$25	Dacusville Elementary	I
5	Kristopher Edwards	$25	Dacusville Elementary	I
4	Quenez Robinson	$25	Forest Heights Elementary	II

Grade	Winner	$ Amt	SCHOOL	Reg
SCHOOL PRIZE WINNERS				
4	Ashley Smith	$25	Forest Heights Elementary	II
4	Kodesia Nelson	$25	Forest Heights Elementary	II
4	Tamesha Bryant	$25	Forest Heights Elementary	II
5	George Rapley	$25	Forest Heights Elementary	II
5	Tybresha Domaneck	$25	Forest Heights Elementary	II
5	Carlos Cunningham	$25	Greeleyville Elementary	II
5	Chadwick Johnson	$25	Hunter Kinard Tyler Elementary	II
5	Chadwick Johnson	$25	Hunter Kinard Tyler Elementary	II
6	Benjamin Kirkland	$25	Hunter Kinard Tyler Elementary	II
6	Casey Douglas	$25	Hunter Kinard Tyler Elementary	II
7	Lauren Shealy	$25	Irmo Middle School	II
4	Alexandra Deluna	$25	JK Gourdin Elementary	V
5	Jayla Cannon	$25	Joseph P. Keels Elementary	II
5	Benji Milner	$25	Lakeview Elementary	I
5	Jack McAlhany	$25	Lakeview Elementary	I
5	Jenna Pruett	$25	Lockett Elementary	II
7	Briana Press	$25	Marrington Middle	V
4	Kelly Elliott	$25	McCormick Elementary	IV
4	Amanda Harrelson	$25	McCormick Elementary	IV
4	Elisha Utley	$25	McCormick Elementary	IV
4	LaVerne Page Jr.	$25	McCormick Elementary	IV
4	Ana Maye	$25	Minnie Hughes Elementary	V
4	Gregory Richardson	$25	Minnie Hughes Elementary	V
4	Beuron Holmes	$25	Minnie Hughes Elementary	V
8	Jalesa Smalls	$25	Miracle Academy	V
4	Meghana Rao	$25	Montessori School of Florence	IV
5	Gregory Gischia	$25	Mossy Oaks Elementary	VII
?	Christopher Rikabi	$25	Newberry Middle	II
5	Kenyal Gilbert	$25	Palmetto Elementary	IV
4	Khaneisha Gibbs	$25	Pomaria Garmany Elementary	II
4	Katie Bryant	$25	Port Royal Elementary	VII
7	Monisha Bowens	$25	R D Schroder Middle	V
5	Billy Joye	$25	Andrews Elementary	IV
5	Tanisha Nesmith	$25	Andrews Elementary	IV
6	Arthur Anglin	$25	Beaufort Middle	VII
7	Sue Ann Simpson	$25	Belton Middle	I
7	Emily Loudermilk	$25	Belton Middle	I
7	Erin Bidwell	$25	Belton Middle	I
7	Anna Miller	$25	Belton Middle	I
7	Lauren Brown	$25	Belton Middle	I
7	Jeremy Wardlaw	$25	Belton Middle	I
7	Molly Clinkscales	$25	Belton Middle	I
7	Creed Campbell	$25	Belton Middle	I
7	Kelsey Smith	$25	Belton Middle	I
5	Braydan Keasler	$25	Ben Hagood Elementary	I
8	Emily Horton	$25	Blue Ridge Middle	I
4	Theodore Vargo	$25	Boulder Bluff Elementary	V
5	Sean Bell	$25	Boulder Bluff Elementary	V
5	Austin Westwood	$25	Boundary Street Elementary	II
7	Caitlin Mills	$25	Branchville High	II
8	Patrick Vallentine	$25	Branchville High	II
8	Kearsten Furtick	$25	Branchville High	II
8	John Ott	$25	Branchville High	II
4	Angel Gordon	$25	Burton Pack Elementary	II
5	Andyah Garrison	$25	Burton Pack Elementary	II
6	Paul Czeresko III	$25	Bush River Connection	II
5	Hallie Simmons	$25	Calhoun Street Elementary	I
7	Rodrigo Maceda	$25	Cambridge Academy	I
8	JD Green	$25	Camden Middle School	II
8	Eric Bunton	$25	CE Williams Middle	V

Grade	Winner	$ Amt	SCHOOL	Reg
SCHOOL PRIZE WINNERS				
5	Kelly McNair	$25	Centerville Elementary	I
5	Ashleigh Dickson	$25	Centerville Elementary	I
6	Jay Wilson	$25	Chereekee Trail Elementary	I
4	Wesley Pilgrim	$25	Cherokee Trails Elementary	I
5	Anna Burk	$25	Covenant Christain School	II
6	Sammy White	$25	Covenant Christain School	II
6	Rebekah Bowen	$25	Covenant Christain School	II
7	Emily Eisenstadt	$25	Crayton Middle	II
5	Brooke Tidwell	$25	Crestview Elementary	I
5	Zachary Masters	$25	Dacusville Elementary	I
5	Emery Thomas	$25	Richard Carrol Elem Campus B	II
6	Dylan Augenstein	$25	Robert Smalls Middle	VII
7	Melissa Rauton	$25	Rollings Middle School of Arts	V
7	Lacy Bigham	$25	Rollings Middle School of Arts	V
7	Jimmy Bouteny	$25	Rollings Middle School of Arts	V
7	Laughlin Flanagan	$25	Rollings Middle School of Arts	V
7	Lindsey Wuerfel	$25	Rollings Middle School of Arts	V
7	Noelle Cunningham	$25	Rollings Middle School of Arts	V
7	Chelsea Ford	$25	Rollings Middle School of Arts	V
7	Paige Hardy	$25	Rollings Middle School of Arts	V
7	David Edwards	$25	Rollings Middle School of Arts	V
7	Morgan Jones	$25	Rollings Middle School of Arts	V
8	Emily Burns	$25	Rollings Middle School of Arts	V
8	Lauren Bader	$25	Rollings Middle School of Arts	V
8	Catherine Hodieme	$25	Rollings Middle School of Arts	V
8	Katie Rhoden	$25	Rollings Middle School of Arts	V
8	Jacob Lilley	$25	Rollings Middle School of Arts	V
8	Sallie Davis	$25	Rollings Middle School of Arts	V
8	JoAnna Eason	$25	Rollings Middle School of Arts	V
?	Ja'Nice Patterson	$25	Saluda Elementary	I
5	Megan Hanna	$25	Sangaree Intermediate	V
5	Kayla Brown	$25	Sangaree Intermediate	V
5	Allie Goddis	$25	Satchel Ford Elementary	II
5	Ethan Ginn	$25	Varnville Elementary	VII
5	Braylyn Salmond	$25	Varnville Elementary	VII
5	Kelyne Hiers	$25	Varnville Elementary	VII
8	Mark-Anthony Holden	$25	Williamsburg Academy	V
8	Livell Paul	$25	Wright Middle	I

ANNOUNCING

FALL WORKSHOP
For
MIDDLE/ELEMENTARY SCHOOL
ACADEMY OF SCIENCE

Fall Workshop Date: October 8, 2005

South Carolina State University

Dr. Linda Payne
BCO Hub Director
South Carolina State University, College Street
Orangeburg, SC 29117
Phone: Tentative (803) 536-7113 or 536-7078 E-mail: Lpayne@scsu.edu

Who Can Attend: Students in grades 4 - 8, parents, & teachers

Keynote Address:

Bill Hilton Jr.

Executive Director, Hilton Pond Center for the Piedmont Natural History, York, SC
www.hiltonpond.org or www.rubythroat.org

"Operation Ruby Throat: The Hummingbird Project".

IN ADDITION, THERE WILL BE:

Twenty -Five (25 to 30) Hands-on Sessions in Science, Engineering, & Environmental Science
(students pick two)

Topics include:

Observe external & internal components of the logigo (squid) and write your name with the defensive ink. Build & Launch your own Rocket; See Sound for the First Time; Construct a "traditional" Electromagnet or a Telegraph Machine; Make Earrings Using Chemistry; A Walking Environmental Extravaganza, Chain Gang & Chemistry, Polynomials and Polymers and The Center for Science Education (Helping Teachers)

Parents are Welcome to Attend!
Great Ideas for Classroom Teachers, too!

For more information about the scheduled workshop, to register,
or how to join the Middle/Elementary School Academy of Science,
contact:

Dr. Don Jordan, Executive Director, MESAS
College of Arts & Sciences / Center for Science Education / Sumwalt Room 323 /
University of South Carolina / Columbia, SC 29208
Phone: (803) 777-7007; or FAX (803) 777-4396; or E-mail: jordan@gwm.sc.edu
Web: www.cosm.sc.edu/jordan under Middle / Elementary School Academy of Science

NURTURING SCIENCE AND MATH IN SOUTH CAROLINA
For GRADES 4-8
Sponsored by the South Carolina Academy of Science & SC State University

Please copy, distribute, and post for teachers, students and parents to see.

South Carolina Academy of Science Middle/Elementary School Workshop, SC State Univ
October 8, 2005
Sponsered by South Carolina Academy of Science
Total Attendance = 350

				Grade Level										Ethnicity					
Session	F	M	Total	K	1	2	3	4	5	6	7	8	Other	Nat. Am.	Asian	AfrA	Lat.	Cauc	other
1	11	6	17	0	0	1	4	2	0	2	2	5	0	0	4	0	11	2	2
2	9	2	11	0	0	0	1	5	0	0	0	6	0	0	6	0	5	0	0
3																			
4	7	4	11	1	1	2	2	1	0	2	0	1	0	1	2	0	8	0	0
5	5	10	15	0	0	0	3	2	1	0	1	2	6	0	0	2	0	13	0
6																			
7																			
8	10	10	20	0	0	0	2	4	1	6	5	0	2	2	0	8	1	8	2
9	7	7	14	0	0	0	0	7	6	1	0	0	1	3	0	9	1	0	1
10	11	1	12	0	0	0	0	5	4	0	0	2	1	1	0	10	0	1	0
11	2	10	12	0	0	0	0	4	6	1	0	0	1	1	0	4	1	5	1
12	10	6	16	0	0	0	0	0	2	0	13	1	0	1	0	13	1	0	1
13	5	2	7	0	0	0	2	0	0	1	0	2	2	0	0	5	0	2	0
14																			
15	6	6	12	0	0	0	0	0	0	6	1	4	1	1	2	4	0	5	0
16	5	5	10	0	0	0	0	2	3	1	1	1	2	2	1	4	0	1	2
17	6	3	9	0	0	0	0	0	1	0	0	8	0	0	0	8	0	1	0
19	13	3	16	0	0	0	0	5	2	1	0	4	4	1	0	8	0	7	0
21																			
22	2	4	6	0	0	0	1	1	1	2	0	1	0	1	1	2	0	2	0
23																			
24	16	16	32	1	0	0	2	3	5	9	4	3	5	0	0	20	0	11	1
25	5	1	6	0	0	0	0	0	0	2	1	2	1	0	0	4	0	2	0
26	3	1	4	0	0	0	0	0	0	2	0	2	0	0	0	3	0	0	1
27	18	1	19	1	0	0	0	4	5	2	3	1	3	2	0	13	1	2	1
28	22	15	37	0	0	0	2	3	7	1	3	12	10	0	1	20	0	14	3
29																			
30																			
Total	**173**	**113**	**286**	**3**	**1**	**3**	**19**	**48**	**44**	**39**	**34**	**57**	**39**	**16**	**17**	**137**	**29**	**76**	**15**
%	**60**	**39.5**		**1**	**0**	**1**	**7**	**17**	**15**	**14**	**12**	**20**	**14**	**5.594**	**5.9**	**48**	**10.1**	**26.6**	**5.2**
														Total=286					

Approximately 350 attended the Mesas event. Of those, 286 turned the evaluations in on the session.

The Following Sessions did not turn In evaluation forms:
3
6
7
14
18
20
21
23
29
30

Approximately 350 people were in attendance for the USC Midlands MESAS SC State University Workshop on October 8, 2005. Of these, 286 filled out evaluation forms. Of those 286, 60% were female and 40% were male. Also, Apprx. 48% were African American, 26.6% were Caucasian, 5.2% were of other nationality, 5.59% were Native American Indian, 5.9% were Asian or Pacific Islander, and 10.1% were Hispanic.

ANNOUNCING

FALL WORKSHOP
For
MIDDLE/ELEMENTARY SCHOOL
ACADEMY OF SCIENCE

Fall Workshop Date: October 15, 2005

Furman University

Host

Dr. Joseph Pollard
Department of Biology
Furman University, 3300 Poinsett Highway
Greenville SC 29613-0418

Who Can Attend: Students in grades 4 - 8, parents, & teachers

Keynote Address:

Merrie Southgate

Furman University and SC Academy of Science (M.E.S.A.S). presents Merrie Southgate, author of the acclaimed *Agnes Pflumm* science education novels in an unforgettable "performance" of the REAL story of Agnes Pflumm. To learn more about this truck-drivin', dance-crazy, artist-turned-science teacher, go to www.agnespflumm.com!

"Operation Science with Agnes Pflumm"

IN ADDITION, THERE WILL BE:

Twenty-Five to Thirty Hands-on Sessions in Science, Engineering, & Environmental Science
(students pick two)

Topics include: (Tentative)

Chemical Capers – Science On Wheels (SOW) by Roper Mountain; Explore Jocassee Gorge; A Nature Walk of Native, Invasive, or Endangered Plants; Introduction to the amazing opportunities available to computing (Girls Pay Special Attention); Extract DNA from your own cheek cells; Microorganisms and biological weapons; Virtual Trip to a Cove Forest; The Jason Project, and Silly Ice Cream and much more!

Parents are Welcome to Attend!
Great Ideas for Classroom Teachers, too!

For more information about the scheduled workshop, to register, or to learn how to join the Middle/Elementary School Academy of Science, contact:

Rosemary Wicker, Director, Upper Savannah Science / Math Hub
Lander University, Greenwood, SC 29649
Phone: (864) 388-8966; or FAX (864) 388-8130; or E-mail: rwicker@lander.edu
Web: www.cosm.sc.edu/jordan under Middle / Elementary School Academy of Science

NURTURING SCIENCE AND MATH IN SOUTH CAROLINA
For GRADES 4-8
Sponsored by the South Carolina Academy of Science & Furman University

Please copy, distribute, and post for teachers, students and parents to see.

South Carolina Academy of Science Middle/Elementary School Workshop, Furman Univ
October 15, 2005
Sponsered by South Carolina Academy of Science
Total Attendance ≈ 200

				Grade Level										Ethnicity					
Session	F	M	Total	K	1	2	3	4	5	6	7	8	Other	Nat. Am.	Asian	AfrA	Lat.	Cauc	other
1																			
2																			
3	0	2	2	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2	0
4																			
5	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
6																			
7	4	8	12	0	0	0	0	3	1	1	1	3	3	0	0	2	0	10	0
8																			
9	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
10	6	2	8	0	0	0	0	1	1	1	0	3	2	0	0	1	0	7	0
11																			
12	1	11	12	0	0	0	0	0	1	3	2	4	2	0	1	2	0	9	0
13	3	4	7	0	0	0	1	0	0	2	0	1	3	0	2	1	0	4	0
14																			
15	1	1	2	0	0	0	0	1	0	0	0	1	0	1	0	1	0	0	0
16	0	4	4	0	0	0	0	0	0	0	2	2	0	0	0	1	0	3	0
17																			
18																			
19																			
20	4	3	7	0	0	0	0	1	1	2	0	0	3	0	0	0	0	7	0
21	10	7	17	0	0	0	0	4	0	1	4	5	3	0	0	1	1	15	0
22	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
23	3	1	4	0	0	0	0	1	0	1	0	2	0	0	0	2	0	2	0
24	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Total	**35**	**44**	**79**	**0**	**0**	**0**	**1**	**13**	**4**	**13**	**9**	**22**	**17**	**1**	**3**	**12**	**2**	**61**	**0**
%	**44**	**55.7**		**0**	**0**	**0**	**1**	**16**	**5**	**16**	**11**	**28**	**22**	**1.266**	**3.8**	**15**	**2.53**	**77.2**	**0**
										Total= 79						**Total=79**			
Approximately 200 attended the MESAS event. Of those, 79 turned the evaluations in on the session.																			

The Following Sessions did not turn in evaluation forms:
1
2
4
8
11
14
17
18
19
25

Approximately 200 people were in attendance for the USC Midlands MESAS Furman University Workshop on October 15, 2005. Of these, 79 filled out evaluation forms. Of those 79, 55% were male and 44% were male. Also, Apprx.77% were Caucasian, 15% were African American, 3.8% were Asian or Pacific Islander, 2.5% were Hispanic and 1.2% were Native American Indian.

MESAS Region IV Treasures Report 2005

CIVIC CHECKING-MM	ACCOUNT NUMBER	5128337786

-ACCOUNT SUMMARY-

PREVIOUS BALANCE AS OF 05-31-05		975.31
0 DEPOSITS/CREDITS	.00+	
0 CHECKS PAID	.00-	
0 WITHDRAWALS/DEBITS	.00-	
SERVICE CHARGE	.00-	
NEW BALANCE AS OF 06-30-05		975.31

FOR ASSISTANCE, CALL (843) 664-1010 OR FOR BB&T PHONE24, CALL (800)BANKBBT (1-800-226-5228).

Dr. John Safko

Dr. Don Jordan

Mr. Anthony Kurlychek :

There has been no activity in this account during the last fiscal year. Since I have retired, I probably should close this account and send the balance to Dr. Safko. A new director for the region needs to be named and activities resumed.

Sincerely,

Tom

Tom Roop, Ph.D.
Professor, emeritus
Director, MESAS Region IV

Other MESAS Regions:

No 2005 reports

ANNOUNCING

2005-2006
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 FOR 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
Rosemary Wicker, Director
Upper Savannah Math / Science Hub
CPO 6052, Lander University
Greenwood, SC 29649
Ph: 864-388-8966/Fax 864-388-8130
E-mail: rwicker@lander.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: jordan@gwm.sc.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

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: whaleymc@yahoo.com

If a student receives a research grant, then he or she must make a 10-minute ORAL presentation at the next SCAS/SCJAS/MESAS Annual Meeting (March 10, 2006, at USC).

For information contact: Dr. Don Jordan at the address/phone/fax/e-mail above.

South Carolina Science & Engineering Fairs 2005

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 2005 activites by region follow this summary information.

IA. Upstate SC Region IA Science 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
Deadline to Enter: TBA 2006
Location for Competition: Palmetto Expo Center, Greenville, SC
DATES: Tuesday, March 28, 2006 from 2-9PM.
Location for Awards Ceremony: Palmetto Expo Center
AWARDS: TBA: 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: geornwel@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: http://www.ces.clemson.edu/aophub/
Location for Competition: Clemson University, SC
DATES: March 2, 2006 at Madren Center, Clemson, SC
AWARDS: March 21, 2006 at Tillman Hall, Clemson University - Sends 1-2 teachers and up to 5 students to the Intel International Fair.
SPONSORS: Clemson University, Duke Power, Honeywell 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

II. Central South Carolina Region II Science and Engineering Fair
Counties: Calhoun, Clarendon, Fairfield, Kershaw, Lexington, Newberry, Orangeburg, Richland, Sumter
Serves: Students in grades 6-12 in three divisions: Junior - Grades 6-8; Senior - Grades 9-12; and Teams
Web page: www.hrsm.sc.edu/jordan
AWARDS: April 4, 2006 Sends 2 teachers and up to 8 students to the Intel International Fair.
SPONSORS: USC's President's Office; Provost's Office; College of Science and Mathematics; 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.
DATES: March 31, 2006
Location for Competition: Carolina Coliseum, University of South Carolina, Columbia, SC.
Contact: Dr. Don M. Jordan: E-mail: 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, Spartanburg, SC
Dates: March 28th-April 1st, 2006.
Awards: 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

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: TBA 2006.
AWARDS: Sends 1-2 teachers and up to 5 students to the Intel International Fair ;
Other Awards: Two(2) College Scholarships, one each to the two Grand Winners provided by Carolina Power & Light and Pee Dee Electric Cooperative; 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

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 20, 2006.
AWARDS: 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: TBA 2006
AWARDS: TBA 2006 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 VII 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 15th, 2006: Junior/Senior Division, **March 16th, 2006**: Middle School (Dates are tentative)
AWARDS: TBA 2006 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, 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: March 29th, 2006
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.
Fair Dates: ISEF, Indianapolis, IN, **May 7-13, 2006**.
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.

Chairperson
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

NO 2005 ACTIVITIES REPORT RECEIVED

IB. Western/Upstate SC Region IB Science Fair

Once again our 2005 was a great success. Almost 600 students presented their projects for judging and below is an abbreviated list of our winners.

Elementary Grand Prize Winner was Ishani Ummat, 4th grader from Clemson Elementary School, District Pickens
Junior Grand Prize Winner(s) were 6th graders Kyle and Trevor Ritland, yes twins! Both scored 99's (completely different judging teams!) We attempted a tie-breaker and couldn't do it! The boys attend Honea Path Middle, in Anderson District #2
Our Senior Grand Prize Winner was Amanda Graham a 10th grader also from Anderson District #2, Belton Honea Path High School

We sent two students to the ISEF competition: Amanda Graham: Our Senior Grand Prize Winner 10th grader from Anderson District #2, Belton Honea Path High School and Christopher David Balding, a senior from Pickens High School in the Pickens District.

We recognized 28 Young Discovery Awardees as follows:
6 - 8th graders
4 - 7th graders
6 - 6th graders
12 - 5th graders
Overall we awarded over $20,000 in cash and prizes

Thanks,
Angela Foxx, Director
AOP Regional Science Fair
ISEF #500701

II. Central South Carolina Region II University of South Carolina Science and Engineering Fair

NO 2005 ACTIVITIES REPORT RECEIVED

III. Piedmont Region III Science Fair

The SC Piedmont Region III Science Fair was held in late March, 2005. The over-all winner was Amber Wray, and first runner-up was Eboni Wafford, both students of Wendy Tindall at Gaffney High School. These two young women represented our Fair at the ISEF. Our Fair hosts Elementary, Middle School, and Senior High competition. Of 503 projects in the Middle School competition, 38 were nominated for the Discovery Channel Young Scientist Challenge.

Lyle Campbell, Director

IV. Sandhills Region IV Science Fair

NO 2004 ACTIVITIES REPORT RECEIVED

V. Lowcountry Region V Science Fair

NO 2005 ACTIVITIES REPORT RECEIVED

VI. Central Savannah River Area Region VI CSRA Science and Engineering Fair

ISEF Awards:
Society of Environmental Toxicology and Chemistry - Awards are given to the best projects in Environmental toxicology and Chemistry. In addition all winners will receive a certificate of recognition.

Third Award of $100
EV122 Effects of Temperature on Dietary Accumulation and Toxic Effects of Methylmercury in Red Swamp Crayfish (Procambarus clarkii) William Patrick Jagoe, 17, A. R. Johnson Health Sciences and Engineering High, Augusta, Georgia

Environmental Sciences - Presented by Ricoh
Intel will present Best of Category Winners with a $5,000 award and an Intel(R) Centrino(tm) mobile technology-based notebook computer. Additionally, a $1,000 grant will be given to their school and the Intel ISEF Affiliated fair they represent

Fourth Award of $500
EV121 Biological Oxygen Demand at International Paper's Point Source Discharge Lauren Wooten Smith, 16, John S. Davidson Fine Arts Magnet School, Augusta, Georgia

EV122 Effects of Temperature on Dietary Accumulation and Toxic Effects of Methylmercury in Red Swamp Crayfish (Procambarus clarkii) William Patrick Jagoe, 17, A. R. Johnson Health Sciences and Engineering High, Augusta, Georgia

VII. Sea Island Region VII Science and Engineering Fair

NO 2005 ACTIVITIES REPORT RECEIVED

VIII. Independent School Association

NO 2005 ACTIVITIES REPORT RECEIVED

IX. South Carolina International Science and Engineering Fair

Committee Chair, Tina Webb-Browning

2005 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 (5th- 8th graders) who have conducted sound scientific research and who are able to best communicate about science.

Eligibility

1. Nominee(s) must be in the 5th- 8th grade when they compete at our fair.
2. Nominee(s) must place in your fair's category judging (1st- 4th 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 consider 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 2005 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 2004 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 2005 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?

THE MIDLANDS FINEST

58 Students from the Midlands were nominated by the International Science & Engineering Fair to compete nationwide this summer with other states in

THE 7TH ANNUAL DISCOVERY CHANNEL YOUNG SCIENTIST CHALLENGE

Discovery Communications, Inc., nominated 58 of the Midlands finest to compete in the 2005 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 2005. 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.

Lee Brandenburg
Geiger Elementary School

The photographs that follow are just 33 of the 58 students nominated from the Midlands. The other nominees are listed in the table following the photographs..

Eliza J Smith
Ironwood Elementary School

Chelsea Greene
Elloree Elementary School

Zachary Poston
Cross Roads Middle School

Najma Y Mitchell
Elloree Elementary School

Shivani Agarwal
Dent Middle School

Benjamin Kirkland
Hunter-Kinard-Tyler Elem

Emily Eisenstadt
Crayton Middle School

Velina Kozareva
Harbison West Elementary

Jessica Truesdale
Camden Middle School

Arjun Aggarwal
Lexington Elementary

James A Stroman
William J. Clark Middle

Nicholas Currie
Thomas Sumter Academy

Bushra Rahman
Islamic Acad Of Columbia

Chandler Barton
Dent Middle School

Sara K Scoggins
St. Josephs Catholic School

Trevor Auman
Dent Middle School

Lauren Nixon
Summit Parkway Middle

Jack Brandt
Thomas Sumter Academy

Robert Lloyd
Webber Elementary School

Giovanni Dwight
Webber Elementary School

Spencer Skelley
Cross Roads Middle

Marshall Sheorn
Brennenn Elementary School

Suha Najjar
Islamic Acad Of Columbia

John J Ruffalo
Bates Middle School

Frederik Holm
Summit Parkway Middle

Rachitha Rajan
Dent Middle School

Mark A Valentin
Webber Elementary School

Raenita M Clark
Holly Hill Middle School

Nathan Brown
Webber Elementary School

Austin Layden
Crayton Middle School

Muniral Islam Tawfique
Islamic Acad Of Columbia

Grace Zimmermann
St. Josephs Catholic School

Student	Gr	School	Teacher Name
John J. Ruffalo	8	Bates Middle School	Gary Bettinger
Tom Walsh	8	Blythewood Middle School	Carolyn H. Murphy
Stephen Gregg	8		Carolyn H. Murphy
Katie Foshee	8		Jamie Westmoreland
Matthew Wilson	8		Jamie Westmoreland
Eliza J. Smith	5	Brennen Elementary School	Vera Tucker
Marshall Sheorn	5		Vera Tucker
Lee Williams	7	Camden Middle School	Kathy Dozier
Jessica Truesdale	7		Crystal Welch
Braeden E. Howard	7		Kathy Dozier
Brittany Flemming	6	Crayton Middle School	Mary Louise Miller
Katelyn Bowie	7		Andrea Karaffa
Emily Eisenstadt	8		Vicki Brown
Austin Layden	8		Ilona Sunday
David Hicks	8		Ilona Sunday
Joseph Ghoeheh	8		Ilona Sunday
Spencer Skelley	6	Cross Roads Middle School	Linda Durstine
Zachary Poston	6		Shana Grier
Shivani Agarwal	8	Dent Middle School	Susan Yelton
Barry D. Brown	8		Susan Yelton
Trevor W. Auman	8		Susan Yelton
Chandler M. Barton	8		Susan Yelton
Rachitha Rajan	8		Susan Yelton
Matthew Harding	8	E.L. Wright Middle School	Kyle Reeves
Chelsea Greene	5	Elloree Elementary School	Rena McDonald
Najma Mitchell	6		Vernelle Williams
Lee Bradenburg	6	Geiger Elementary School	D. Walker
Theodore Cowara	8	Hand Middle School	Linda Rast
Velina Kozareva	5	Harbison West Elementary	Angel Norris
Megan Keith	6	Hillcrest Middle School	Ramona M. Bradley
Raenita M. Clark	8	Holly Hill Middle School	Cheryl Dodd
Benjamin P. Kirkland	6	Hunter-Kinard-Tyler Elementary	Katrina Montgomery
Munirul Islam Tawfique	6	Islamic Academy Of Columbia	Afroze Habib
Suha Najjar	7		Afroze Habib
Bushra Rahman	6		Afroze Habib
Arjun Aggarwal	5	Lexington Elementary School	Melony Davis
Mason Thornley	5	Lugoff Elementary School	Emma Segars
Kayla Huhs	5	Manchester Elementary	Frannette W. Edwards
JT Crawford	5	Rhino Christian Academy (homeschool)	Audrey Crawford
Taylor F. Patterson	8	St. Andrews Middle School	Carol Olexa
Sara K. Scoggins	5	St. Josephs Catholic School	Frances Goodrich
Grace Zimmermann	5		Frances Goodrich
Lauren Nixon	8	Summit Parkway Middle	Jane Perry
Kevin Haith	8		Jane Perry
Justen Braddock	8		Marriah Schwallier
Chad Davis	8		Jennifer N. Sullivan
Julie DePasquale	8		Jennifer N. Sullivan
Frederik Holm	8		Jennifer N. Sullivan
Nadine Leudicke	8		Jennifer N. Sullivan
Nicholas Currie	8	Thomas Sumter Academy	James Monnett
Meredith Snapp	8		James Monnett
Jacob Andrew Brandt	6		Guy Eckenroth
Rachel Johnson	5	Vance Providence Elementary	Diane Belanger
Mark Valentine	5	Webber Elementary School	Amy Umberger
Nathan Brown	5		Amy Umberger
Robert Lloyd	5		Amy Umberger
Giovanni Dwight	5		Amy Umberger
James A. Stroman, II	8	William J. Clark Middle	Lisa Benton

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 (*systeme international d'unites*).

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 1,645 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)
   By appointment, at SCAS/SCJAS Annual Meeting site, at SCSC, or at the SCCTM Annual Meeting
   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.

SCSC SC Science Council
SCAS SC Academy of Science
SCJAS SC Junior Academy of Science
SCCTM SC Council of Teachers of Mathematics
USMA 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

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. Sharry Bailey (301)
Spring Valley High School

Ms. Marcia Burckhalter (302)
Barnwell High School

Ms. Barbara Gardner (303)
Wade Hampton High School

Mr. Larry Mason (304)
Union High School

Ms. Clarice Wenz (305)
Goose Creek High School

Ms. Linda Sinclair (306)
St.Dept.of Ed. Sci Council

Ms. Rosalyn Burton (307)
S. Aiken High School

Mr. Richard Porter (308)
Cainhoy High School

Mr. David C. Keller (309)
McCormick High School

Mr. Robert I. McDonald (310)
Timmonsville High School

Mr. Stephen T. Ravan (311)
Crescent High School

Ms. Edna S. Mills (312)
Meriwether Elem. School

Mr. John L. Kinard (313)
Greenwood High School

Mr. James D. Angel (314)
Palmetto High School

Mr. Johnny Davis (315)
Georgetown School District

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Calhoun County H.S.

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