

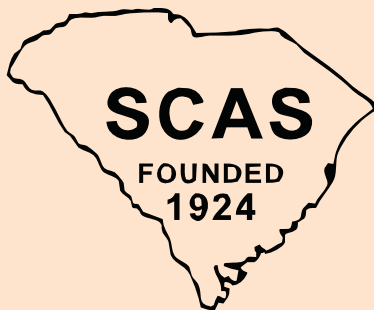
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BULLETIN

of the

SOUTH CAROLINA
ACADEMY OF SCIENCE

INCLUDING 2008 MEETING PROGRAM



VOLUME LXX
2008

**THE SOUTH CAROLINA ACADEMY OF SCIENCE
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Melissa Riley	Clemson University
Tom Roop, Sandhills MESAS Director	Francis Marion University
Judith Salley	SC State University
George Shiflet	Wofford College
Linda Sinclair, Science Week, S.C. Dept of Ed. Rep.	S.C. Dept. of Education
David Stroup	Francis Marion University
Brianna Timmerman	USC Columbia
Tina Webb-Browning, Science Fair Coordinator	Hilton Head High School
Mary Whaley, Low Country MESAS Director	

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

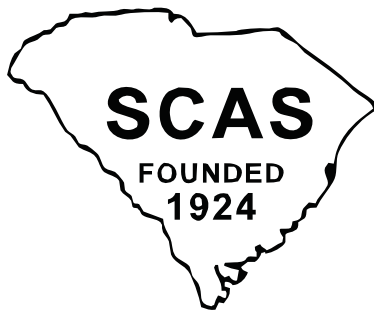
David K. Ferris, Editor, *SCAS Bulletin* and *SCAS Journal* USC Upstate
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BULLETIN

of the

**SOUTH CAROLINA
ACADEMY OF SCIENCE**

INCLUDING 2008 MEETING PROGRAM



**VOLUME LXX
2008**

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

Its purposes are:

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

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

Contents

SCAS OFFICERS, COUNCIL MEMBERS	inside front cover
PURPOSE OF THE ACADEMY	i
JOURNAL OF THE SOUTH CAROLINA ACADEMY OF SCIENCE	2
SCAS WEB SITE:	2
MEETING SCHEDULE	3
INVITED SPEAKERS	5
PRESIDENT'S MESSAGE	6
SPONSORS AND PATRONS	8
TEACHER OF THE YEAR	11
GOVERNOR'S AWARD	12
TOPICAL SESSIONS	19
Chemistry/Biochemistry Session A	19
Chemistry/Biochemistry Session B	20
Chemistry/Biochemistry Session C	20
Molecular/Cell Biology Session A	21
Molecular/Cell Biology Session B	22
Molecular/Cell Biology Session C	23
Field Biology	24
Physics/Astronomy	25
Math/Computer Science	26
SCASM	26
POSTER PRESENTATIONS	27
JUNIOR ACADEMY OF SCIENCE ABSTRACTS	29
ACADEMY OF SCIENCE ABSTRACTS	58
SOUTH CAROLINA ACADEMY OF SCIENCE ANNUAL REPORTS	94
President's Report / 2008 annual meeting	95
Secretary's report	97
Treasurer's Report	109
Junior Academy of Science Treasurer's Report	112
Undergraduate Research Awards Committee	114
Middle/Elementary School Academy of Science (MESAS)	116
South Carolina Science & Engineering Fairs	125
Discovery Channel Young Scientist Challenge	137
Certified Metrication Specialist (CMS) Program	142
SCAS Manual of Procedures	145
SOUTH CAROLINA ACADEMY OF SCIENCE MEMBERS	161
AUTHOR/PRESENTER INDEX	170
PAST PRESIDENTS	inside back cover



Journal of the South Carolina Academy of Science

Publish Your Meeting Abstracts!

Did you know the South Carolina Academy of Sciences publishes a peer-reviewed electronic journal? The journal also includes a 2008 meeting proceedings volume (non-peer reviewed), so please submit extended versions of your oral and poster presentations! Publication of your research as part of the meeting proceedings section does not prevent subsequent publication of your material in a peer-reviewed outlet such as the SCAS Journal. Articles for peer-review are being accepted for the Fall issue. Research articles, review papers, and notes are welcome.

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

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

David K. Ferris
SCAS Journal Editor
dkferris@uscupstate.edu

SCAS Web Site:
www.scacadsci.org

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

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

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

**SCHEDULE, EIGHT-FIRST ANNUAL MEETING
SOUTH CAROLINA ACADEMY OF SCIENCE
March 20th, 2008
CLEMSON UNIVERSITY, CLEMSON, SOUTH CAROLINA**

Wednesday, March 19th

6:00 PM - 9:00 PM SCAS Council Meeting Hendrix Student Center

Thursday, March 20th

7:30 AM - 6:30 PM **SCAS, SCJAS, & SCASM Annual Meeting**

7:30 AM - 2:00 PM **Registration**
Hendrix Student Ctr., 1st & 2nd Floor Lobbies

8:30 AM - 3:00 PM **Poster Session** 2nd Floor Hallway
8:30 AM - 10:30 AM Set-up Hendrix Student Ctr.
1:30 PM - 3:00 PM Judging, Authors must attend

8:30 AM - 10:45 AM	Morning Session	Senior Academy
	Chemistry/Biochemistry Session A	Room 214 Daniel
	Chemistry/Biochemistry Session B	Room 313 Daniel
	Chemistry/Biochemistry Session C	Room 308 Daniel
	Molecular and Cell Biology Session A	Room 315 Daniel
	Molecular and Cell Biology Session B	Room 201 Daniel
	Molecular and Cell Biology Session C	Room 304 Daniel
	Field Biology	Room 206 Daniel
	Physics and Astronomy Session A	Room 312 Daniel
	Physics and Astronomy Session B	Room 311 Daniel

9:30 AM - 10:30 AM **SCASM** McKissick Theater, Hendrix Ctr.
Branch Lectureship (open to all attendees)

**Dr. Daniel R. Bond, Microbiology/Bio Technology
Institute, University of Minnesota “Bacterial
Fuel Cells” sponsored by the SC Branch of the
American Society for Microbiology**

11:00 AM **Plenary Session** Main Ballroom
Hendrix Student Ctr.

**Welcome: Dr. Christian Prziembel, VP for Research and
Economic Development**

**Keynote Presentation: *Dr. Bruce Yandle*
*“The Role of Social Institutions in Managing
and Protecting our Environmental Assets”***

(Schedule continued on next page)

**SCHEDULE, EIGHT-FIRST ANNUAL MEETING
SOUTH CAROLINA ACADEMY OF SCIENCE
March 20th, 2008
CLEMSON UNIVERSITY, CLEMSON, SOUTH CAROLINA**

12:00 PM	Science Week Announcement Awards Presentation SCAS Council Members Introduction	Main Ballroom Hendrix Center
12:00 PM - 1:00 PM	SCJAS Lunch	Hendrix Student Center, 2 nd Floor Main Ballroom Hallway
12:00 PM - 1:30 PM	SCAMP/SEAGEP/INBRE Networking & Lunch	Hendrix Student Center Meeting Room A/B
12:30 PM - 1:30 PM	SCAS Lunch	Hendrix Student Center 2 nd Floor Main Ballroom Hallway
1:30 PM - 2:45 PM	Afternoon Session Mathematics/Computer Science/Geology	Senior Academy Room 214 Daniel
3:15 PM – 4:15 PM	Featured Speaker <i>Dr. David Bodde,</i> <i>“Energy in the Summer of our Discontent”</i>	Hendrix Center Ballroom
4:15 PM – 5:30 PM	Alternative Fuel & Hydrogen Fuel Cell Demonstrations <i>Tom Baloga, Vice President, Engineering,</i> <i>BMW North America, LLC</i> <i>Carl W. Flesher, Director, BMW Global Business Development</i> <i>Jason Perron, CleanEnergy Manager, BMW</i>	Hendrix Center Ballroom
5:00 PM - 6:30 PM	SCJAS Awards Banquet	Hendrix Student Center Ballroom
5:00 PM	SCAS Business Meeting	Hendrix Student Ctr. 2nd Floor Conf. Room
5:00 PM	SCASM Business Meeting	Hendrix Student Ctr. 3rd Floor Conf. Room

SCAS and SCJAS Judge’s Room	Hendrix Student Center, 2nd Floor Glass Meeting Room Adjacent to the Information Desk
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Biographical Sketches

Speakers Featured at the 2008 SCAS Annual Meeting

Plenary Speaker Bruce Yandle, Ph.D.

Interim Dean of the College of Business and Behavioral Science, Clemson University.

Dr. Bruce Yandle is Professor of Economics Emeritus at Clemson University where he has been a faculty member since 1969. Dr. Yandle has served in Washington on two occasions. He was a senior economist on the President's Council on Wage and Price Stability during the Ford and Carter administrations and was Executive Director of the Federal Trade Commission during the Reagan administration. He teaches in George Mason University's Capitol Hill Campus in Washington and is a Senior Associate with the Property and Environmental Research Center in Bozeman, Montana. Author / editor of a dozen books on regulation, Dr. Yandle has served as board member and as chairman of the South Carolina State Board of Economic Advisors. He is chairman of the board of trustees of Spartanburg Methodist College and writes a quarterly newsletter on the economy for Clemson's Strom Thurmond Institute. Prior to pursuing a career in university teaching, Dr. Yandle was in the industrial machinery business for 15 years. He received his MBA and PhD degrees from Georgia State University.

Featured Speaker David Bodde, Ph.D.

Senior Fellow and Professor, Arthur M. Spiro Institute for Entrepreneurial Leadership, Clemson University

Dr. David Bodde holds a Doctor of Business Administration from Harvard University and Master of Science degrees in Nuclear Engineering and Management. He was Chairman of the Electric Power Research Institute Advisory Council 1999-2002 and Chair of the U.S. Department of Energy Environmental Management Advisory Board from 1996 - 2001. Co-author of *The Hydrogen Economy*, and author of numerous additional publications, Dr. Bodde specializes in Technology and strategy in the energy industries and advance energy technology.



The South Carolina Academy of Science

LETTER FROM THE PRESIDENT



I am pleased to report that the South Carolina Academy of Science has had another successful year.

The Eightieth Annual Meeting of the South Carolina Academy of Science (SCAS) was held in conjunction with the South Carolina Junior Academy of Science (SCJAS) on Friday, April 20, 2007 at the Airport Campus of Midlands Technical College in Columbia, SC. More than 300 research papers and posters were presented throughout the day in twelve topical sessions. This is only the second time that the annual meeting has been held at one of the technical colleges in our state.

An interesting array of invited speakers were featured. The keynote presentation was given by **Dr. Michele Dominick Bishop**, an Assistant Professor of Medicine at the Mayo Medical School in Jacksonville, Florida and a nationally recognized expert in gastroenterology and hepatology who

specializes in pancreatic diseases. **Dr. Bassam Shakhshiri**, a Professor of Chemistry at the University of Wisconsin-Madison and former chief education officer at the National Science Foundation presented *Science and Scientific Literacy* illustrating how complicated chemical processes can be explained through many of the fascinating chemical demonstrations that he had developed over the years. **Mr. Howard Burnham** a gifted scholar and actor presented *On the Shoulders of Giants* in which he portrayed five famous scientists whose vision and research changed the course of human history including Aristotle, Louis Pasteur, Sir Isaac Newton and Albert Einstein.

The 2007 SCAS Annual Meeting was an enormous success with more than 500 individuals attending the event. As the President of the South Carolina Academy of Science, I want to encourage you to support this important volunteer organization. No other professional group in the state supports and encourages scientific research and science awareness in the manner of the SCAS with our numerous activities throughout all levels of our educational system. At no point in human history has science and technology been expected to find solutions for problems as great as global warming or alternative energy sources. At no point has science and technology had greater resources to deal with these challenges. The SCAS plays a critical role in integrating the activities of research scientists from throughout the state with the activities of business and industry, as well as, recognizing the state's most effective

science teachers and programs. Your support and membership in SCAS plays a crucial role in continuing the effective work that for so long has been characteristic of this organization.

This year our annual meeting will be held at Clemson University on March 20, 2008. Our President-Elect Dr. Dave Gangemi will be coordinating the event. In addition to the usual program, Dave is planning a number of new activities to encourage greater participation by undergraduate students and high school teachers from throughout the state. I have enjoyed working with Dave over the past year, and I can tell you that the SCAS annual meeting could not be in better hands.

For more information pertaining to the SCAS, please do not hesitate to contact me at reevest@midlandstech.edu or telephone 803-822-3554. It has been an honor to serve as president of the SCAS. I look forward to seeing you at the annual meeting and working with you in the upcoming year.

Sincerely,

A handwritten signature in cursive script that reads "Thomas Reeves".

Tom Reeves
President, South Carolina Academy of Science

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
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USC Aiken

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Office of the President
Charleston, SC

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Sealed Air
Duncan , SC

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Columbia, SC

Greenville Technical
College
Chairman of Biology

Lander University

Phibro-Tech Inc
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Fort Lee, NJ

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Conservation Districts
Columbia, SC

The Citadel

USC Upstate
College of Arts &
Sciences

Erskine College

Govern's School, Science
& Math
Hartsville, SC

SC State University

Sequa Chemicals Inc
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Chester, SC

Sonoco Products
Hartsville, SC

Springs Industries
Fort Mill, SC

University of South
Carolina Columbia

Dave Gillespie
Presbyterian College

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

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

**South Carolina Academy of Science 2007 Award for
Excellence in Secondary Science or Mathematics
Teaching is Presented to:**

**MICHELLE MARY
KATHERINE SUTTON**

**Teacher of Biology and Research
Spring Valley High School**



Miss Sutton received a BS in Biology from the Honors College at USC in 2001, and a MAT in Natural Science in 2003. At Spring Valley High School she serves as Research Director for the Magnet Math and Sciences Programs, as Head of the Biology Department and as mentor for new teachers. As the Technology Mentor for her school, she is truly a competent professional with an unsurpassed knowledge of scientific instrumentation which she shares with both teachers and students.

Michelle Sutton spends an inordinate number of hours beyond the school day on student research and AP Biology test preparation, resulting in a 93% pass rate on the AP Biology College Boards. A professor at USC observes that the countless hours spent working with students to develop methodology, perform experiments, analyze data and edit research papers and presentations reflect Miss Sutton's true passion for scientific research. Michelle says that she tries to make every lesson personally relevant to students and their lives. For example, some of her first AP students showed a lack of knowledge or interest in plants, so she centered the curriculum design around hands-on learning. Students now raise all of their own plants, make daily observations and perform experiments on them. They are much more excited about the connections revealed through daily observations of the plant life cycle, and they have come to realize that science is a way of learning through Discovery.

Miss Sutton is Spring Valley's SCJAS sponsor. She has brought over 70 presenters during the past four years to the SCJAS Annual Meeting. She is also greatly involved in local science fairs as sponsor and judge.

Miss Sutton has accompanied South Carolina students to the International Science Fair twice and three times has taken her award-winning students to the National Junior Science and Humanities Symposia sponsored by the U.S. Department of Defense. She was the honored recipient of the Junior Science and Humanities Teacher Award in 2005 and 2006. Last year she received the SCJAS Sponsor Award.

The assistant principal for Curriculum and Instruction who nominated her tells us that "Michelle Sutton is an incredible professional, phenomenal teacher and possesses numerous talents that she shares with others. Her impact on student learning, student achievement and the education profession is profound." But it is her tireless spirit of giving the tools and knowledge of Science to those whose lives she touches that makes her exemplary. Michelle Mary Katherine Sutton truly merits the 2007 SCAS Award for Excellence in Science Discovery.

Dr. Tom Roop, Teacher of the Year Chairman

Governor's Award for Excellence in Science 2008

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 **Roche Carolina Inc.** took the lead, in 2004 **MeadWestvaco** joined and in 2005 **Michelin North America** joined in sponsorship of the Governor's Awards.

Beginning in 1990, two of these awards were given annually with one being for scientific discovery and the other for scientific awareness. In 2005 the Academy, in conjunction with the Governor's Office, initiated the sponsorship of a third award directed to a gifted young researcher (*only those individuals who have completed no more than 12 years beyond the Ph.D.*). The award is called the Governor's Young Scientist Award for Excellence in Scientific Research and was sponsored by Michelin North America. The awards consist 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
Center for Science Education
College of Arts and Sciences
Sumwalt Room 323
University of South Carolina
Columbia SC 29208
Email: Jordan@gwm.sc.edu



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

PAST RECIPIENTS

James R. Durig, 1985.....	University of South Carolina
Howard F. Harrison, 1986.....	CR Seeds, Hartsville, South Carolina
F. John Vemberg, 1987.....	University of South Carolina
Danyl D. DesMarteau, 1988.....	Clemson University
Harry S. Margollus, 1988.....	Medical University of South Carolina
Lon B. Knight, Jr., 1989.....	Furman University
Paul D. Ellis, 1990.....	University of South Carolina
William J. Padgett, 1990.....	University of South Carolina
James A. Marshall, 1991.....	University of South Carolina
Rudolph E. Mancke, 1991.....	SC Educational Television Network
Makio Ogawa, 1992.....	Medical University of South Carolina
Larry Joe McCumber, 1992.....	Francis Marion University
Yakir Aharonov, 1993.....	University of South Carolina
William F. Junkin, III, 1993.....	Erskine College
Donald D. Clayton, 1994.....	Clemson University
R. Bruce Dunlap, 1994.....	University of South Carolina
Frank Avignone, 1995.....	University of South Carolina
Daniel Antion, 1995.....	University of South Carolina
Elizabeth Martin, 1996.....	College of Charleston
Maria G. Buse, 1996.....	Medical University of South Carolina
John H. Dawson, 1997.....	University of South Carolina
Sarah F. Stallings, 1997.....	Winthrop University
Joseph Manson, 1998.....	Clemson University
George E. Temple, 1998.....	Medical University of South Carolina
Michael Farmer, 1999.....	Greenville Technical College
Roy Edward Wuthier, 1999.....	University of South Carolina
Thomas Borg, 2000.....	South Carolina School of Medicine
Louis Terracio, 2000.....	South Carolina School of Medicine
Elaine L. Craft, 2000.....	State Center for Excellence
Kenneth Marcus, 2001.....	University of South Carolina Aiken
Jeffrey M. Priest, 2001.....	University of South Carolina Aiken
Roger R. Markwald, 2002.....	Medical University of South Carolina
William T. Pennington, 2002.....	Clemson University
Richard D. Adams, 2003.....	University of South Carolina Columbia
Charles Beam, 2003.....	College of Charleston
John W. Baynes, 2004.....	University of South Carolina Columbia
David J. Stroup, 2004.....	Francis Marion University
Frank Berger, 2005.....	University of South Carolina Columbia
Thomas Reeves, 2005.....	Midlands Technical College
Ya-Ping Sun, 2005.....	Clemson University
Gabriel Virella, 2005.....	Medical University of South Carolina
Omar Bagasra, 2006.....	Clafin University
Rebecca Bullard-Dillard, 2006.....	Clafin University
Karen Burg, 2006.....	Clemson University
Yusuf Hannun, 2006.....	Medical University of South Carolina
Stacey Franklin Jones, 2007.....	Benedict College
Varavut Limpasuvan, 2007.....	Coastal Carolina University
Daniel Reger 2007.....	University of South Carolina

2007 Governor's Award for Excellence in Science Awareness

The 2007 Governor's Award for Science Awareness is awarded to

Dr. Stacey Franklin Jones

Dr. Stacey Franklin Jones obtained her Doctoral degree in Computer Science at George Washington University, School of Engineering and Applied Sciences in Washington, D.C. in 1997. She is an *honors* (4.0/4.0) graduate of the Johns Hopkins University, Whiting School of Engineering in Baltimore, Maryland earning two separate Masters of Science degrees in Numerical Science (1986) and Technical Management (1991). She is also a *magna cum laude* graduate of Howard University, School of Arts and Sciences in Washington, D.C. earning a Bachelor of Science degree in Mathematics in 1982. Dr. Jones' academic accomplishments are complemented by development training at Harvard Graduate School of Education – Management Development Program, the Hampton University Executive Leadership Program and as an American Council on Education Fellow. In 2000, Dr. Jones joined the faculty at Benedict College as the Chair of the Mathematics and Computer Science Department and became the charter Dean of the School of Science, Technology, Engineering and Mathematics at Benedict College in 2002. In 2006, Dr. Jones achieved tenure as Professor of Computer Science and Mathematics at Benedict College.

Dr. Jones is a Westinghouse Engineering Achievement Award recipient, recognized for the design and development of the beam steering control for the electronically agile antenna of the U.S. Air Force AN/APQ-164 (B1-B). She was the 2004 National Society of Black Engineers' Outstanding Woman in Technology Award Recipient. She is a Senior Member of the Institute of Electrical and Electronics Engineers, an honor bestowed on only 7% of IEEE members internationally, and a 2005-2006 Bush/Hewlett Foundation Awardee. Dr. Jones has been a visiting professor and presenter internationally including Beijing, China, New Delhi, India, and Havana, Cuba. Dr. Jones is a pioneer in scientific computing, an innovator in science and mathematics education, and a leader in the advancement of awareness that facilitates an increase in the state, regional and national pool of scientists. Her contributions as an investigator which include publications in innovative mathematics and mobile computing, as a collaborator and as a leader, have significantly advanced the preparation of a new generation of scientists.

As early as the mid 1980's, Dr. Jones developed curriculum and supervised a team of engineers to teach inner city middle school students, as well as working with secondary school girls in Society of Women Engineers' projects. She was described as 'innovative and dynamic ... infusing her students with tremendous motivation, and instilling in them an appetite for the joys of learning'. This work led to the Navy's recognition of the Westinghouse Defense and Electronic Center's (D&EC) effort to assist youth and a 1986 Westinghouse Steering Committee Award of Excellence for Dr. Jones.

Dr. Jones' unique perspective on discovery, her contagious excitement of exploration in science and technology, and the impact of her work has had an arm's reach of literally thousands in the state of South Carolina – from ages 6 to 76. Dr. Jones has served as host, keynote speaker, leader and/or co-director of the 2006 Middle and Elementary School Academy of Science Workshop, 2006-2007 South Carolina Citizen's School of Nanotechnology, 2006 Broadband in the Cities and Towns, Xtreme Technology Event

for secondary school students, Midlands collaborations highlighting law enforcement and science, summer program design introducing young scientists and mathematicians to Wall Street, the first nationally accredited Environmental Science Program in South Carolina, national recognition by the American Institute of Physics and the U.S. Department of Education for the production of baccalaureates in Physics and the Physical Sciences, and innovative design of engineering programs in South Carolina.

2007 Governor's Award for Excellence in Scientific Research

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

Dr. Daniel L. Reger

The 2007 Governor's Award for Excellence in Scientific Research goes to Carolina Distinguished Professor Daniel L. Reger, of the Department of Chemistry and Biochemistry, University of South Carolina.

Dr. Reger received his Ph. D. in Inorganic Chemistry from Massachusetts Institute of Technology and joined the faculty at the University of South Carolina in 1972. He was promoted to Associate Professor in 1977 and Professor in 1984. In 1998, he was named Carolina Distinguished Professor.

Dr. Reger has published over 180 original research articles in well respected chemistry journals. He has mentored 27 Ph.D. students, one M.S. student and numerous postdoctoral fellows and undergraduate students. He is internationally recognized for his research in organometallic and coordination chemistry. He pioneered research in the area of alkyl/alkenyl-metal complexes and prepared the first difluorocarbene complex. He investigated the use of phase transfer reaction conditions for transition metal catalyst systems, conditions now used for important reactions on the industrial scale. He developed important coordination chemistry using poly(pyrazolyl)borate ligands to stabilize complexes of metals from all portions of the periodic table. He became the world leader in developing the chemistry of poly(pyrazolyl)methane ligands. He introduced the term "third generation" ligands and used them to develop important supramolecular chemistry. This research has been funded by grants for over 3 million dollars from the National Science Foundation, the National Institute of Health, the Department of Energy and the Petroleum Research Foundation. He also was a leader of numerous University wide EPSCoR research grants that have brought in over 5 million dollars to the University for faculty development.

Dr. Reger has received numerous prestigious awards during his career at the University of South Carolina, including: the Educational Foundation Research Award for Science, Mathematics and Engineering; Michael J. Mungo Award for Excellence in Undergraduate Teaching; Amoco Outstanding Teacher Award; Carolina Trustees Professor and the Michael J. Mungo Award for Excellence in Graduate Teaching. He was one of the founding teachers in the University's program that trains new graduate students and faculty in all departments to be effective teachers. His textbook (Chemistry, Principles and Practice, First/Second Edition, Saunders College Publishing, Phila. 1993/1997, with S. R. Goode and E. E. Mercer) is used for the mainstream Introductory Chemistry course at the University of South Carolina and other universities and colleges across the country. He has also co-authored a number of laboratory manuals, student study guides and an extensive series of Powerpoint slides for the introductory course.

Dr. Reger served as Associate Dean for Research and Finance for the College of Science and Mathematics for two years, prior to becoming Chair of the Department of Chemistry and Biochemistry for the past six years. As Chair, he has led the Department in the hire of nine outstanding new faculty and maintained the momentum of established faculty.

2007 Governor's Young Scientist Award for Excellence in Scientific Research

The 2007 Governor's Young Scientist Award for Excellence in Scientific Research goes to

Dr. Varavut Limpasuvan

The 2007 Governor's Young Scientist Award for Excellence in Scientific Research is awarded to Dr. Varavut Limpasuvan, Professor of Physics at Coastal Carolina University.

Born in Bangkok, Thailand, Varavut ("Var") came to the United States in 1981. His father sacrificed a promising career in Civil Engineering and uprooted his family, moving from Bangkok to Los Angeles, in order to provide better educational opportunities for his children. Unable to speak English, Mr. Limpasuvan worked odd jobs to support the family. Var attended Belmont High School in downtown Los Angeles with nearly 3,500 students. In 1987, he graduated with the highest GPA in his senior class.

Var went on to earn his Bachelor degree in Physics at Occidental College (as a *Phi Beta Kappa* inductee) in 1990. In 1992, he completed a second Bachelor degree (with honors) in Mechanical Engineering from the California Institute of Technology. At CalTech, he developed a strong interest in fluid dynamics and received an NSF summer fellowship to study Physical Oceanography at the University of Rhode Island.

During that 1991 summer, Hurricane Bob struck Rhode Island and his first-hand experience as a hurricane evacuee prompted Var to begin studying the Earth's atmosphere. In 1998, he completed his Ph.D. in Atmospheric Science at the University of Washington. As a graduate student, his first publication on a recurring atmospheric phenomenon graced the front cover of the American Geophysical Union's *Geophysical Research Letters*. Toward the end of his graduate studies, he became fascinated by the possible connection between the stratosphere and day-to-day weather. He pursued this interest as a Research Associate at the *Joint Institute for the Study of Atmosphere and Ocean* (Seattle, WA). There, he published two seminal papers on the coupled interactions between the stratosphere and surface climate.

Recalling the liberal arts education he received as an undergraduate, and sensing the importance of undergraduate teaching, Var joined the faculty at Coastal Carolina University as an Assistant Professor in 2000. During his first year at CCU, he was recognized as the *Professor of the Year* for his exemplary teaching. In that same year, he published research results with a Norwegian scientist on the occurrence of ozone depletion over Europe which was highlighted by *Nature News*. In his second year at CCU, Var received the *Governor's Distinguished Professor Award* from the South Carolina Commission on Higher Education.

In 2002, he received the *American Society of Engineering Education Award for Contribution to NASA*. In 2005, as part of CCU's public engagement effort, Var provided research services to the NASA Jet Propulsion Laboratory (JPL) and earned the *NASA's Group Achievement Award* for scientific advancement through JPL's Microwave Limb Sounder team. His recent work on the connection of vortex break-down and surface climate was featured in the World Meteorological Organization's *Stratospheric Processes and Their Role in Climate News* and the American Meteorological Society's *Bulletin of American Meteorological Society*. Despite being at a primarily teaching institution, Var

has authored over 12 peer reviewed publications on atmospheric waves and their roles in altering large-scale flows. With continual funding from NASA and NSF, he works with weather and climate prediction models, as well as satellite data, often in collaboration with leading scientists across the nation and the world. He consistently involves undergraduates in his activities to further their science education. Most of his former students have gone on to graduate programs related to Atmospheric Physics.

To date, in remembrance of his father's sacrifice for his education, Var dedicates himself to motivating CCU students in the classroom and enhancing their education through research activities.

TOPICAL SESSIONS

Presenter names are in **bold text**

CHEMISTRY/BIOCHEMISTRY SESSION A

PRESIDING: KEN MARCUS

ROOM 214 DANIEL

Morning Session

8:30 AM

STRONG BASE MULTIPLE ANION PREPARATION OF NEW SPIRO-HETEROCYCLES CONTAINING BENZISOTHIAZOLE DIOXIDE WITH PYRAZOLES OR ISOXAZOLES, Anna C. Dawsey, **Chandra Potter**, John D. Knight, Jordan B. Brown, Clyde R. Metz, Charles F. Beam, William T. Pennington, Donald G. VanDerveer, N. Dwight Camper, Chemistry and Biochemistry, College of Charleston

8:45 AM

PREPARATION OF N-PHENYLYRAZOLE-BENZOIC ACIDS FROM DILITHIATED PHENYLHYDRAZONES AND METHYL HYDROGEN PHTHALATE, Anna C. Dawsey, Chandra Potter, John D. Knight, and **Charles F. Beam**, Chemistry and Biochemistry, College of Charleston

9:00 AM

PREPARATION OF NH-PYRAZOLES FROM POLYLITHIATED HYDRAZONES OR DILITHIATED BETA-KETOESTERS AND A VARIETY OF AROMATIC ESTERS, Gregory N. Goschy, Anna C. Dawsey, John D. Knight, Jordan B. Brown, and **Charles F. Beam**, Chemistry and Biochemistry, College of Charleston

9:15 AM Break

9:30 AM

CD SUBSTITUTION EFFECT IN $Bi_{1.6}Pb_{0.4}Sr_2Ca_{2-x}Cd_xO_y$, **Allen J. Carlton** and Jafar Amirzadeh, Division of Natural Sciences, Morris College

9:45 AM

SYNTHESIS AND CHARACTERIZATION OF $Tl_2Ba_2Ca_6Cu_7O_x$, **Nathaniel Robinson** and Jafar Amirzadeh, Division of Natural Sciences and Mathematics, Morris College

10:00 AM

SYNTHESIS OF AN $\{2'-(1-ETHYL-4,5-DIMETHYL-1H-IMIDAZOL-2-YL)BIPHENYL-3-YL\}OXY\}ACETIC$ ACID; AN INHIBITOR OF AP2 AND A NEW APPROACH FOR DIABETES TREATMENT, **Morgan Perry Davis Jr.**, **Shekelia Baccus** and D. Magnin, Division of Natural Sciences and Mathematics, Morris College

10:15 AM

HYALURONAN ANTAGONISM IN GLIOMA PROGENITOR CELLS, **Britney F. Tucker**, Jennie Gilg¹ and Bernard L. Maria¹, Morris College, ¹Department of Pediatrics, Charles P. Darby Children's Research Institute, Medical University of South Carolina
¹Department of Pediatrics, Charles P. Darby Children's Research Institute, Medical University of South Carolina

CHEMISTRY/BIOCHEMISTRY SESSION B
PRESIDING: SHIOU-JYH HWU
ROOM 313 DANIEL

Morning Session

8:30 AM

SYNTHESIS AND CHARACTERIZATION OF NEW AMINO-BIS-PHOSPHONATES, **Jonetha Fleming** and Pete Peterson, Francis Marion University

8:45 AM

SYNTHESIS AND CRYSTAL STRUCTURES OF SOME INORGANIC-ORGANIC HYBRIDS CONTAINING FLUOROSACHARINATE, **Larnelle Peterson** and Pete Peterson, Francis Marion University

9:00 AM

SYNTHESIS AND CRYSTAL STRUCTURES OF SOME ZINC (II) AND CADMIUM (II) FLUOROCARBOXYLATE INORGANIC-ORGANIC HYBRID SOLIDS, **Diana Rishmawi** and Pete Peterson, Francis Marion University

9:15 AM BREAK

9:30 AM

SYNTHESIS, CRYSTAL STRUCTURE, AND UV-VISIBLE SPECTRUM OF $[\text{BiI}_2(\text{C}_5\text{H}_{11}\text{N}_3)_2][\text{BiI}_4(\text{C}_5\text{H}_{11}\text{N}_3)]$, **Katie Lewis** and Pete Peterson, Francis Marion University

9:45 AM

NEW METAL-ORGANIC COMPOUNDS UTILIZING 2, 2'-BIPYRIMIDINE, **Sarah Hickman** and Pete Peterson, Francis Marion University

10:00 AM

DEVELOPMENT OF A REACTOR FOR BIOHYDROGEN PRODUCTION, **Daniel Steele** and Joe N. Emily, Department of Biological and Physical Sciences, South Carolina State University

10:15 AM

CHARACTERIZATION OF THE MANGANESE-OXIDIZING PROTEIN FROM *LEPTOTHRIX DISCOPHORA*, **Onica Washington**, Pamela Riggs-Gelasco, Department of Chemistry and Biochemistry, College of Charleston

CHEMISTRY/BIOCHEMISTRY SESSION C
PRESIDING: CHIN-FU CHEN
ROOM 308 DANIEL

Morning Session

8:30 AM

A MULTI-LEVEL RISK ASSESSMENT OF WOMEN LIVING WITH HIV/AIDS IN KENYA, Ashlee Riggs, **Pearl Fernandes**, John Mecham¹, Erica Kosal², and Michael Otieno³, Div. of Science, Mathematics and Engineering, USC Sumter, ¹Dept. of Biology and Health Sciences, Meredith College, ²North Carolina Wesleyan College, ³Kenyatta University

8:45 AM

PROTEOMIC STUDIES OF BACTERIAL DIVERSITY IN INDOOR AIR, **Shonda Jones**, Elisangela Castanha, Karen Fox, Alvin Fox, Charles Feigley¹, and Deborah Salzberg¹, Dept. of Pathology and Microbiology, USC School of Medicine, ¹Arnold School of Public Health, USC Columbia

9:00 AM

COMPARATIVE ANALYSIS OF *CLOSTRIDIUM PERFRINGENS* BACTERIOPHAGE, **Dorea Pleasant**, Robin Kuntz¹, Greg Siragusa¹, and Bruce Seal¹, Biology Dept., Claflin University, ¹USDA, Agricultural Research Service, Poultry Microbiological Safety Research Unit

9:15 AM Break

9:30 AM

CLONING OF A HAMMERHEAD RIBOZYME TARGETED TO HIV-1 VIRION INFECTIVITY FACTOR, **Audrey Hendley**, Dept. of Biology and Geology, USC Aiken

9:45 AM

EXPRESSION OF AN ANTI-HIV TAT RIBOZYME IN A TISSUE CULTURE MODEL, **Amanda Gerolstein**, Dept. of Biology and Geology, USC Aiken

10:00 AM

OPTIMIZING TITER OF A RETROVIRAL VECTOR EXPRESSING AN ANTI-HIV-1 TAT HAMMERHEAD RIBOZYME, **Theresa Ramos**, Dept. of Biology and Geology, USC Aiken

MOLECULAR AND CELL BIOLOGY SESSION A
PRESIDING: ANDY MOUNT
ROOM 315 DANIEL

Morning Session

8:30 AM

EXTREMOPHILIC TEMPERATURE ADAPTATION IN LUCIFERASES; TEMPERATURE BIOSENSORS, **Johnnie Walker** and Nicholas Panasik, Dept. of Chemistry, Claflin University

8:45 AM

ADIPONECTIN MEMBRANE RECEPTORS: ADIPOR1 AND ADIPOR2, **Alena James** and Chasta Parker, Winthrop University

9:00 AM

THE EFFECT OF LASER ASSISTED HATCHING (LAH) ON SUBSEQUENT MOUSE EMBRYO DEVELOPMENT, **Yvonne K. Kao**, Jennifer E. Graves¹, Jane E. Johnson¹, H. Lee Higdon III¹, William R. Boone¹, South Carolina Governor's School for the Arts & Humanities, ¹Dept. of Obstetrics and Gynecology, Division of Reproductive Endocrinology and Infertility, Greenville Hospital System University Medical Center

9:15 AM Break

9:30 AM

THE *B. CEREUS* CONTAINING SUB-BRANCH MOST CLOSELY RELATED TO *B. ANTHRACIS*, HAVE SINGLE AMINO ACID SUBSTITUTIONS IN SMALL ACID SOLUBLE PROTEINS, BUT REMAINING SUB-BRANCHES ARE MORE VARIABLE, **Courtney Callahan**, Elisangela R. Castanha, Karen F. Fox, and Alvin Fox, Dept. of Pathology, Microbiology and Immunology, USC School of Medicine

9:45 AM

EFFECT OF OVEREXPRESSION OF TISSUE TRANSGLUTAMINASE (TG) ON CELLULAR GROWTH AND INDUCTION OF APOPTOSIS IN HUMAN BREAST CANCER CELLS, **I. Chepkoech**, N. Gray, C. Esquivia-Zapata, and B. Fraij, Dept. of Biology, Chemistry and Environmental Health Sciences, Benedict College

10:00 AM

INVOLVEMENT OF HSP70 CHAPERONE IN AUTOPHAGIC CELL DEATH OF INSECT FLIGHT MUSCLES, **Octavia Allen**, Acchia Albury, and Rush Oliver, Dept. of Biology, Chemistry and Environmental Health Sciences, Benedict College, and Dept. of Biology, USC, Columbia

MOLECULAR AND CELL BIOLOGY SESSION B
PRESIDING: LESLY TEMESVARI
ROOM 201 DANIEL

Morning Session

8:45 AM

INTERLEUKIN 1-BETA EXPRESSION IN SOLID MALIGNANCIES, **Anika J. Dodds**, Mansoor Abdul, and Naseema Hoosein, Dept. of Biology, Claflin University

9:00 AM

EFFECT OF CELL FIXATION ON PROTEINS TAGGED WITH GREEN FLUORESCENT PROTEIN, **Krissy Smith** and Tim Shannon, Francis Marion University

9:15 AM

IMMUNOLocalIZATION OF ZONULA OCCLUDENS-1 (ZO-1) IN MCF-7 CELLS FOLLOWING TREATMENT WITH 17 β -ESTRADIOL AND TAMOXIFEN, **Clorissa Washington**, John Rollinson, and Samir Raychoudhury, Dept. of Biology, Chemistry and Environmental Health Science, Benedict College

9:30 AM Break

9:45 AM

DIFFERENTIAL EXPRESSION OF ZINC TRANSPORTER 1 (HZIP1) IN NORMAL AND MALIGNANT PROSTATE TISSUES FROM AFRICAN AMERICANS AND EUROPEAN AMERICANS, **Maureen Watson** and Omar Bagasra, Dept. of Biology, Claflin University

10:00 AM

EFFECTS OF 17β -ESTROGEN, TAMOXIFEN AND POLYCYCLIC AROMATIC HYDROCARBONS ON HUMAN BREAST CANCER CELL VIABILITY, **Ayana Martin**, John Rollinson, and Samir Raychoudhury, Dept. of Biology, Chemistry, and Environmental Health Science, Benedict College

10:15 AM

TOO MUCH OF A GOOD THING: SPERM INSEMINATION DOSE AND INTRAUTERINE INSEMINATION PREGNANCY RATES, **Shilpa Gupta**, Herman Senter, and Xiaoqian Sun, and H. Lee Higdon III¹, William R. Boone¹, Dept. of Mathematics Sciences, Clemson University, ¹Dept. of Obstetrics and Gynecology, Division of Reproductive Endocrinology and Infertility, Greenville Hospital System University Medical Center

MOLECULAR AND CELL BIOLOGY SESSION C
PRESIDING: FRANK BERGER
ROOM 304 DANIEL

Morning Session

8:30 AM

A LONGITUDINAL STUDY OF FOLLICLE STIMULATING HORMONE EXPRESSION IN PREPUBERTAL MICE, **Linlei Ward**, Jennifer Richter-Maze, and T.D. Maze, Dept. of Biology, Lander University

8:45 AM

FLAP ENDONUCLEASE FROM *ARCHAEGLOBUS FULGIDUS*, **Stedmen Bolger**, Sherell Morrison and Jianguo Chen, Dept. of Biology, Claflin University

9:00 AM

EFFECT OF PATHOGEN ON MIRNA TARGETS AND CLONING OF MIR-GENES FOR OVEREXPRESSION, **Shonnette Grant** and Chellappan Padmanabhan¹, Dept. of Biology, Claflin University, ¹Dept. of Microbiology and Plant Pathology, University of California at Riverside

9:15 AM Break

9:30 AM

GENETIC ANALYSIS OF PHELAN MCDERMID SYNDROME, Barbara Dupont, Fordyce G. Lux III¹, and **Lisa J. Todd**¹, Greenwood Genetics Center, ¹Lander University

9:45 AM

THE IMPORTANCE OF CALCIUM AND THE MP20 PROTEIN IN INSECT FLIGHT MUSCLE USING STRETCH ACTIVATION, **George Miller** and Agnes Ayme-Southgate, Dept. of Biology, College of Charleston

10:00 AM

HOW DO INSECTS FLY: BIOINFORMATICS ANALYSIS OF THE MUSCLE PROTEIN PROJECTIN, **Drew Philipp**, Richard Southgate and Agnes Ayme-Southgate, Dept. of Biology, College of Charleston

FIELD BIOLOGY
PRESIDING: DEREK ZELMER
ROOM 206 DANIEL

Morning Session

8:30 AM

PATTERNS OF COMMUNITY SIMILARITIES OF FISHES OF THE EDISTO RIVER, **Sarah Mayson** and Derek Zelman, Dept. of Biology and Geology, USC Aiken

8:45 AM

THE EFFECTS DROUGHT, INCREASED SALINITY, AND HURRICANE DISTURBANCE ON TIDAL FRESHWATER FOREST PRODUCTIVITY AND GREENHOUSE GAS PRODUCTION, **Jamie Duberstein** and William Conner, Clemson University

9:00 AM

UNIQUE ANATOMICAL AND CHEMICAL FEATURES OF NONGLANDULAR TRICHOMES IN BIG MOUNTAIN SAGEBRUSH: A PROPOSED HEAT-SINK MECHANISM TO CONTROL LEAF TEMPERATURE AND WATER CONSERVATION, **J. Henry Slone**, Dept. of Biology, Francis Marion University

9:15 AM

DIMORPHIC SEEDS SHOW DIFFERENTIAL VIABILITY WITH AGE, **Shari Bookert** and Andrew R. Dyer, Dept. of Biology & Geology, USC Aiken

9:30 AM Break

9:45 AM

SEMIOCHEMICAL BASED MANAGEMENT STRATEGIES FOR CIGARETTE BEETLES: ARE WE THERE YET?, **Rizana Mahroof**, South Carolina State University

10:00 AM

SEED PRODUCTION IN 40 VASCULAR PLANT SPECIES, **Dr. Richard Stalter** and Angelica Delgado, Department of Biology, St. John's University

10:15 AM

A PRELIMINARY STUDY OF THE VASCULAR FLORA AT THE LEVY PRESERVE, NASSAU COUNTY, NEW YORK, **R. Stalter**, J. Velovic, S. Jones, J. Kernizan, U. Khan, E. Youssef, Department of Biology, St. John's University

10:30 AM

A PRELIMINARY OF THE VASCULAR FLORA AT THE BROOKHAVEN NATIONAL LABORATORY, LONG ISLAND, NEW YORK, **R. Stalter**, J. Velovic, E. Lamont, A. Jung, A. Alphonese, E. Youssef, A. Chaudhry and G. Grigoryan, Department of Biology, St. John's University

**PHYSICS AND ASTRONOMY SESSION A
PRESIDING: DAVE TEDESCHI
ROOM 312 DANIEL**

Morning Session

8:45 AM

A NUMERICAL STUDY OF JETS FROM TILTED BLACK-HOLE ACCRETION DISKS, **Christopher C. Lindner** and P. Chris Fragile, Dept. of Physics and Astronomy, College of Charleston

9:00 AM

THE RADIUS AND RATE OF PERIOD CHANGE OF THE S-CEPHEID, EU TAURI, **Kirk A. Boyer**, Christina Lewandowski and Robert J. Dukes Jr., Dept. of Physics and Astronomy, College of Charleston

9:15 AM

OPTICAL CHARACTERIZATION OF A NEW SUNSCREEN, **Emily Tavriles**, Narayanan Kuthirummal, and Linda Jones, Dept. of Physics and Astronomy, College of Charleston

9:30 AM Break

9:45 AM

USING MATHEMATICAL METHODS TO EXTRACT DIFFICULT TO MEASURE VALUES OF PDT, **Daryl Reynolds**, Jane Buchanan, Norris Preyer, and Linda Jones, Dept. of Physics and Astronomy, College of Charleston

10:00 AM

DEPTH DOSE VERIFICATION OF A GEANT4 SIMULATED RADIATION THERAPY TREATMENT HEAD, **Charles Peterson** and David J. Tedeschi, USC Columbia

**PHYSICS AND ASTRONOMY SESSION B
PRESIDING: LEW FETCH
ROOM 311 DANIEL**

Morning Session

9:00 AM

SCAS AND SACS AAPT COLLABORATION FOR IMPROVEMENT OF THE QUALITY OF SCIENCE EDUCATION, **Mikhail M. Agrest**, Dept. of Physics and Astronomy, College of Charleston

9:15 AM

POLITICALLY NONCONFORMING SCIENTISTS MET BEHIND THE IRON CURTAIN, **Mikhail M. Agrest**, Department of Physics and Astronomy, College of Charleston

9:30 AM

AN EXPERIMENTAL INVESTIGATION OF THE DISCHARGE COEFFICIENT FOR AN ORIFICE IN A CIRCULAR PIPE WALL, P. D. Prohaska, **A. A. Khan** and N. B. Kaye, Dept. of Civil Engineering, Clemson University

9:45 AM Break

10:00 AM

COALESCING AXISYMMETRIC TURBULENT JETS, J. R. Smith, **N. B. Kaye** & A. A. Khan, Dept. of Civil Engineering, Clemson University

**MATHEMATICS/COMPUTER SCIENCE/GEOLOGY
PRESIDING: XIAOQIAN SUN
ROOM 214 DANIEL**

Afternoon Session

1:30 PM

DEVELOPMENT OF SEVERE WEATHER IN THE EASTERN UNITED STATES, **Thomas Rolfson**, Laney Mills, Department of Physics and Astronomy, College of Charleston

1:45 PM

TRANSPORTATION FIRM MERGERS IN THE NORTH AMERICAN FREE TRADE AREA, **Clinton Whitehurst**, Clemson University

1:30 PM - 3:00 PM **MICROBIOLOGY SCASM - OPEN SESSION
PRESIDING: JEREMY TZENG
MCKISSICK AUDITORIUM**

Papers to be announced on date of meeting

POSTER PRESENTATIONS
8:30AM- 3:00 PM
SECOND FLOOR HALL - HENDRIX STUDENT CENTER

SET-UP 8:30 AM TO 10:30 AM

*PRESENTERS ARE REQUIRED TO BE AT THEIR POSTER STATION FROM
1:30PM - 3:00PM. POSTERS MAY BE REMOVED AFTER 3:00PM.*

- 01 A FERMENTATION/GC ANALYSIS LAB DESIGNED FOR THE LIBERAL ARTS CHEMISTRY CURRICULUM, Kim L. High, Karen L. Pompeo, Dept. of Math, Science and Engineering, USC Sumter
- 02 ECOLOGY OF DIAMONDBACK TERRAPINS IN NORTH INLET, WINYAH BAY, SC., Peter King, Paige Weaver, and Jennifer Spicer¹, Dept. of Biology, Francis Marion University, ¹North Inlet, Winyah Bay, National Estuarine Research Reserve
- 03 POPULATION DYNAMICS OF *FUSARIUM* SPECIES FOUND IN SOILS AT THE COKER HISTORICAL FARM IN HARTSVILLE, SOUTH CAROLINA, Amber B. Rayfield, A. Michele Burnham, Laice A. Lane, Andrew J. Shychuk, Joseph E. Flaherty, and Dawn E. Fraser¹, Dept. of Science and Mathematics, Coker College, ¹Monsanto Corp. (formerly Delta and Pine Land Company)
- 04 EVALUATING THE TOXICITY OF CYFLUTHRIN TO THE EARTHWORM, *EISENIA FETIDA*, USING 96-HOUR FILTER PAPER CONTACT TESTS, Steven R. Ballesteros and S. Michele Harmon, Dept. of Biology and Geology, USC Aiken
- 05 CONTRIBUTIONS OF TOTAL PETROLEUM HYDROCARBONS TO NON-POINT SOURCE RUNOFF FROM THE USC AIKEN CAMPUS, Michael A. Drinkwater and S. Michele Harmon, Dept. of Biology and Geology, USC Aiken
- 06 IMAGE ANALYSIS TECHNIQUES IN PHASE SEPARATION IMAGES RECORDED IN MICROGRAVITY, Ana Oprisan and Sorinel Oprisan, Greg Smith, John Hegseth¹, Yves Garrabos², and Daniel Beysens², College of Charleston, ¹University of New Orleans, ²University of Bordeaux, France
- 07 EFFECTS OF RADIATIVE COOLING IN SIMULATIONS OF BLACK-HOLE ACCRETION DISKS, Joseph Niehaus and P. Chris Fragile, College of Charleston
- 08 COMPUTATIONAL MODEL OF PYRAMIDAL NEURON COMPUTATIONAL MODEL OF PYRAMIDAL NEURONS IN HIPPOCAMPUS OF MICE, Natasha New, Sorinel Oprisan, Antonietta Lavin¹, and Bailey Glenn¹, Dept. of Physics and Astronomy, College of Charleston, ¹Neuroscience Institute, Medical University of South Carolina
- 09 QUALITATIVE AND QUANTITATIVE ANALYSES OF GINGER AND LICORICE TO STUDY POTENTIAL ANTI-CANCER PROPERTIES, Harskin Hayes Jr., Melissa Riley¹ and Sandra Gray², Dept. of Biological Sciences, Clemson University, ¹ Dept. of Entomology, Soils and Plant Sciences, Clemson University, ² Dept. of Animal and Veterinary Sciences, Clemson University

- 10 CAT'S CLAW AS A POTENTIAL HERB PRODUCT FOR MEDICINAL USE, Angela V. Covington, Melissa Riley¹, and Sandra Gray², Dept. of Biological Sciences, ¹Dept. of Entomology, Soils and Plant Sciences, ²Dept. of Animal and Veterinary Sciences, Clemson University
- 11 CLONING OF A HAMMERHEAD RIBOZYME TARGETED TO THE HIV-1 LTR, Lindsey Padgett, Dept. of Biology and Geology, USC Aiken
- 12 TOXICITY OF TWO COMMONLY-USED PESTICIDES, CYFLUTHRIN AND CHLORPYRIFOS, TO *DAPHNIA MAGNA* IN 48-HOUR STATIC ACUTE TOXICITY TESTS, Anesha A. Maxwell, Rainee N. Wilson, and S. Michele Harmon, Dept. of Biology and Geology, USC Aiken
- 13 TOXICITY OF DIELDRIN TO *DAPHNIA MAGNA* ACCLIMATED TO WATER AND SEDIMENT FROM A POTENTIALLY-contaminated constructed wetland, Heather Mentrup and S. Michele Harmon, Dept. of Biology and Geology, USC Aiken
- 14 RADIOACTIVITY CONCENTRATION OF RADON-222 IN TAP WATER, Stephanie Mitchum, Whitney Boston, Ashley Horton, Portia Griffon, Brittany Green, Stacy Turner, and Zheng Chang, Applied Radiation Science Laboratory, South Carolina State University
- 15 TEMPORAL AND SPATIAL VARIATION OF ABUNDANCES OF COMMON BENTHIC INVERTEBRATES IN THE LYNCHES RIVER, SOUTH CAROLINA, John G. Rae, Dept. of Biology, Francis Marion University
- 16 MYOFIBRIL ASSEMBLY AND ELASTICITY IN DROSOPHILA FLIGHT MUSCLES, Jeff Jankowski, Cynthia Oliva and Agnes Ayme-Southgate, Department of Biology, College of Charleston
- 17 QUANTITATIVE EXPRESSION ANALYSIS OF CANDIDATE REGULATORY GENES INVOLVED IN LIGHT-RESPONSIVE FUNGAL DEVELOPMENT, Shelly M. Catlett, Ashley D. Zearfoss, Sara H. Johnson, Kayla M. Gerberich, and Joseph E. Flaherty, Department of Science and Mathematics, Coker College

SOUTH CAROLINA JUNIOR ACADEMY OF SCIENCE

MEETING ABSTRACTS

MORPHOMETRIC ANALYSES IN *SPEYERIA DIANA*: HOW TIME, GEOGRAPHIC LOCATION AND SEX AFFECT BUTTERFLY WING SHAPE

Marielle Abalo, SC Governor's School for Science and Mathematics

Mentor: Carrie Wells, Clemson University

Advisor: Dr. William C. Alexander

Speyeria diana, the Diana fritillary, is a sexually dimorphic North American butterfly: males have typical fritillary coloration with a bold orange border against dark brown inner wings and females exhibit a deep blue wing border with blue patches against navy inner wings. The habitat of the Diana Fritillary once extended from Arkansas to the East Coast of the United States; however, presently *Speyeria diana* has diverged into two separate populations in the Ozark and Ouachita Mountains of Arkansas and Missouri and in the Southern Appalachians Mountains. This small-scale morphometric study examined the possible influence of time, geographic location, and sex in the morphology of the Southern Appalachian population of the Diana Fritillary. Data were obtained from 159 specimens from the Carnegie Museum of Natural History Collection (Pittsburgh, PA) and the Clemson University (Clemson, SC) Arthropod Collection. Morphometrics is the study of shape variation and its covariation with other variables. Landmark based geometric morphometrics specifically use a set of variables for statistical hypothesis testing and generate graphical representations of shape differences (Adams 1999). Twenty-two hindwing and forewing landmarks from the right wing were analyzed using the softwares tpsDig2, tpsUtil, Morphologika2, and SPSS to conduct Procrustes Analyses, Principal Components Analyses, and Multivariate Analyses of Variance. Significant variation in wing shape was found between males and females, but not between specimens with different collection years and locations. Variation between the sexes was expected because of observed morphological differences in wing shape, coloration, and size.

THE VISCOSITY RESPONSE OF BORONIC-ACID BASED POLYMERS

Jordan R. Anderson, SC Governor's School for Science and Mathematics

Mentor: Dr. Qian Wang, University of South Carolina Columbia

Advisor: Dr. Phelesia Jones-Cooper

The development of a continuous glucose monitoring system is a key step in preventing major medical concerns for diabetics. This project seeks to find a polymer that is glucose specific, in the hope that it could ultimately be used to develop a microelectromechanical system that is capable of continuously monitoring glucose for an indefinite period of time. While several products are already on the market that are designed to continuously monitor glucose, such as Medtronic's Minimed system, they are limited to a retrospective use over a short time span. Using boronic-acid polymers, it was determined that the polymer shows the greatest affinity to glucose. Other sugars, such as fructose and mannose, did bind with the polymer, but at a far smaller level. The specificity of the polymer for glucose indicates that it would be a good polymer to use to determine glucose levels, as the interference from other sugars would be minimal. The polymer's

concentration is also a key factor in the viscosity measurements, because as the polymer binds to glucose, the structure of the sugar allows the polymer to then cross-link with other polymer molecules.

THE EFFECTS OF HIGH AND LOW PROTEIN FEEDS AND STOCKING DENSITIES ON WATER QUALITY, THE GROWTH OF *LITOPENAEUS VANNAMEI* AND THE ENVIRONMENT

Kirsten D. Ayers, SC Governor's School for Science and Mathematics

Mentor: Dr. Heidi Atwood, Waddell Mariculture Center

Advisor: Randall M. LaCross

The shrimp aquaculture industry produces large numbers of shrimp in controlled impoundments and man-made production systems. Although the industry is growing rapidly, environmental concerns ensue with the methods of production. Much of the pollution caused by shrimp farming is due to improper management of water quality parameters. The focus of this project was to monitor water quality in a super-intensive, zero-exchange, greenhouse enclosed, shrimp production system while evaluating growth of Pacific White shrimp stocked at two different densities, fed two different organic feeds (high and low protein content) and utilize the results to predict the essential conditions for optimal growth. Water quality remained satisfactory throughout the experiment so the organic feed did not deteriorate the raceway water or the surrounding environment. The close monitoring of water quality allowed the results to show, based on shrimp weight and mortality rate, which feed and stocking density provided optimal growth and still did not damage the environment. Results showed that stocking shrimp at low densities causes much lower mortality rates. Therefore, it is the most beneficial to use the higher protein Zeigler feed and stock the cages at a lower density. This means there must be a balance between maintaining a low mortality rate and optimizing the production land.

SUBCLONING CALCIUM-ENHANCED GREEN FLUORESCENT PROTEIN TO CREATE A CDNA PLASMID CAPABLE OF EXPRESSING CALCIUM-EGFP IN NEURONS

Sara J. Berry, SC Governor's School for Science and Mathematics.

Mentor: Dr. John Woodward, Medical University of South Carolina Columbia

Advisor: Randall M. LaCross

The research goal of this project was to develop a green fluorescent protein (GFP)-based calcium (Ca^{2+}) probe for expression in neurons. Neuronal intracellular calcium can act as signaling molecules for activation or inactivation of kinases, phosphates, and other enzymes. This signaling plays a role in various physiological processes such as synaptic transmission, learning and memory, and neuronal cell death. The ability to monitor intracellular calcium activity in brain cells is a useful tool to understanding the function of the central nervous system. However, expression of GFP-based Ca^{2+} probes in neurons is hampered due to poor performance of the cytomegalovirus promoter (CMV). To enhance expression of GFP-based Ca^{2+} probes in brain cells this project designed a plasmid that utilizes the neuronal-based synapsin promoter to drive expression in neurons. The synapsin sequence was subcloned into the promoter region of a vector containing GFP and calmodulin sequences. Further studies will be done to characterize the function of this plasmid in various cell types.

PALEOECOLOGICAL EVALUATION OF A PEAT CORE FROM THE CONGAREE NATIONAL PARK

Niles Brinton, SC Governor's School for Science and Mathematics
Mentor: Dr. Arthur D. Cohen, University of South Carolina Columbia
Advisor: Dr. Kurt C. Wagner

In the Congaree National Park, paleomeanders of the ancient Congaree River formed oxbow lakes in its floodplain. Lakes on the edge of the floodplain are known as rimswamps, and are prime environments for peat formation. Over time, a peat layer ten to fifteen feet deep developed in these rimswamps. Radiocarbon dating from previous research in the area shows that the deepest peat is approximately twenty-one thousand years old. Microtome section slides were made and analyzed microscopically for percentages of framework, matrix, total porosity, micropores, macropores, and solids. Microtome section slides were also macroscopically analyzed for color and fiber content to determine subzones in the peat deposit. Peat subsamples were taken and a loss-on-ignition analysis was performed. Macropore percentages were used to calculate hydraulic conductivity of subzones within the peat deposit, aiding in the determination of potential for contaminant transport and extraction. The results of the study revealed five distinct zones within the peat deposit. Additionally, there was a slight increase in ash with depth, with a slight decrease in moisture content and organic matter. Total porosity decreased as depth increased. There was a direct correlation between percent moisture and percent of organic matter. At approximately 125 centimeters, a substantial increase was noted in percentages of matrix, solid, and inorganic matter, while a substantial decrease was noted in percentages of pore space, framework, and organic matter. Hydraulic conductivity increased in the zones with highest framework content and lowest solid content.

SEASONAL FLUCTUATIONS OF *PSEUDO-NITZSCHIA* IN THE SANTA BARBARA BASIN

Christian Buckson, SC Governor's School for Science and Mathematics
Mentor: Emily Sekula, University of South Carolina Columbia
Advisor: Dr. Kurt C. Wagner

Pseudo-nitzschia are diatoms, or microscopic phytoplankton, that can produce domoic acid (DA). DA is a neurotoxin which, when consumed by mammals and birds, can cause brain damage with symptoms ranging from memory loss to death. DA is transferred to higher trophic levels of the food web by fish and shellfish that consume toxic *Pseudo-nitzschia*. These fish and shellfish are then eaten by sea lions, birds, and in some cases humans. The main objective of this project was to identify and count *Pseudo-nitzschia* frustules in sediment trap samples collected between 2002 and 2004 from the Santa Barbara Basin (SBB) in California. Our goal was to determine if surface blooms of *Pseudo-nitzschia* are recorded at the sediment trap depth of 540m. We also examined if seasonal trends in the flux of *Pseudo-nitzschia* existed and if there were possible correlations between the number of *Pseudo-nitzschia* and the availability of nutrients in the waters of the Santa Barbara Basin. Nutrient availability was determined by nitrogen, phosphorus, and silica measurements in the sediment trap material as well as the timing of discharge events from the two major rivers, Santa Clara and Ventura Rivers, emptying into the basin. *Pseudo-nitzschia* numbers were determined using an inverted light microscope after allowing samples to settle in an Ubermühl well slide. From this number we were able to calculate the approximate number of *Pseudo-nitzschia* per gram of sample sediment. Scanning electron microscopy was employed to determine the species of *Pseudo-nitzschia* present during peak abundances.

THE EFFECTS OF MCP-1 AND ESTROGEN ON CELL MIGRATION
Jennifer Burnett, SC Governor's School for Science and Mathematics
Mentor: Dr. Wayne Carver, University of South Carolina School of Medicine
Advisor: Dr. Mark A. Godwin

Cell migration plays important roles in vertebrate development and disease processes like cancer metastasis and inflammation. Many heart diseases are accompanied by inflammatory responses characterized by migration of inflammatory cells into the myocardium. A prolonged inflammatory response is thought to promote the detrimental effects of cardiovascular disease. Recent studies have suggested that the inflammatory response is more prevalent in males than in females due to the protective effects of estrogen. Preliminary studies in our lab illustrate that increased blood pressure stimulates inflammatory cell migration into the heart in male, but not female animals. The goal of the present studies was to determine the effects of Monocyte Chemoattractant Protein-1 (MCP-1), a potent stimulus of inflammatory cell migration, and estrogen on the migration of inflammatory cells. Several migration assays, including scratch assays and chemoattractant chamber assays, were performed with Rat Basophilic Leukemia 2H3 (RBL-2H3) cells in the presence of varying doses of MCP-1 and estrogen. In addition, Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) was used to examine the expression of genes involved in cell migration. RT-PCR analysis indicated that RBL-2H3 cells express several members of the integrin family including the $\beta 1$, $\alpha 4$ and $\alpha 5$ subunits. Continued studies to elucidate the effects of estrogen on the migration of inflammatory cells will provide important new information regarding the protection of females to cardiovascular disease.

GENOMIC DIVERSITY DURING ADAPTIVE RADIATION OF THE HAWAIIAN
SILVERSWORD ALLIANCE

Paige Speed Catotti, SC Governor's School for Science and Mathematics
Mentor: Dr. Amy Lawton-Rauh, Clemson University
Advisor: Dr. Murray H. Siegel

The Hawaiian Silversword Alliance is a group of adaptively-radiating species from the subtribe Madiinae of the family Asteraceae that is often studied for its great morphological and physical diversity over a relatively short span of time. Because these plants are allopolyploids, nucleotide sequencing multiple genes for different Madiinae species examines how diverse genome regions are by using genes located around the genome. Specifically, this project focuses on studying the genome dynamics during adaptive evolution by comparing key genes representing the genomes of the adaptively-radiating Hawaiian Silversword Alliance species *Dubautia arborea*, *D. ciliolata*, *D. reticulata*, *D. menziesii*, and *Argyrophixium sandwicense* (ssp. *macrocephalum*), as well as the progenitor species, the North American tarweeds *Carlquistia muirii*, *Anisocarpus scabridus*, and *Madia sativa*, and other Asteraceae species using the conserved orthologous set markers designed specifically for use across Asteraceae by using comparative mapping across a wide range of species and loci.

THE VARIATION OF THE EFFECTS OF SHADING ON PHOTOVOLTAIC CELLS

Junda Chen, SC Governor's School for Science and Mathematics

Mentor: Dr. Roger A. Dougal, University of South Carolina Columbia

Advisor: Dr. Mark A. Godwin

Solar panels consist of numerous cells connected usually in series. In ideal situations, the panel would sit outside in the sun with no shading obstructing the panel, and the power produced would be at close to optimal. However, this is not always the case. Most of the time, there is some shade on the solar panel. Since photovoltaic cells are insulators when they are not exposed to light, a solar panel with cells connected in series would theoretically produce no power if one whole cell is covered. On the other hand, if the same amount of area covered is kept constant but is spread out evenly over all of the cells, the panel would still function. Because of those two scenarios, it seems evident that how the shading is distributed affects how much power is lost. The goal of this project is to determine the relation between how the shading is distributed and how much power is lost. We are using rectangles of cardboard with equal areas and using the Voltage-Current graphs to find the maximum power produced from the solar panel. We can then graph the % power vs. % coverage of the covered cells. Using this graph, we can determine the relationship between the amount of power lost and the amount the cells are covered.

LONG LASTING CHANGES IN NOCICEPTION FOLLOWING NEONATAL ENDOTHELIN-1 EXPOSURE: ROLE FOR THE ENDOTHELIN-B RECEPTOR

Brittany Coker, South Carolina Governor's School for Science and Mathematics

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

Advisor: Randall M. LaCross

Studies in human infants have shown that painful experiences in infancy (circumcision) can increase pain sensitivity later in life. Endothelin 1 (ET-1) is a vaso-active peptide that is released by the body in response to injury and disease. This project uses ET-1 to model an injury in rats equivalent in age to human infants to show how a painful experience at birth or shortly thereafter can have a long-term effect on the body's sensitivity to pain. For this study, male and female postnatal day 7 rats were administered either saline or ET-1 subcutaneously in the left plantar hindpaw. On postnatal day 50 the rats were challenged with ET-1 subcutaneously in the left plantar hindpaw. Nociceptive-related behaviors (paw flinching and licking) were counted. An increase in ET-1 induced nociception in male rats suggests sensitization. In contrast, a decrease in ET-1 induced nociception was observed in female rats suggesting de-sensitization. With the understanding that ET-1 binds to the endothelin A and B receptors to increase and decrease nociception, respectively, this study also examined changes in these two receptors in hindpaw skin following neonatal exposure to ET-1. Western analysis of endothelin B receptor expression showed a decrease in endothelin B receptor in skin from male animals correlating with behavioral sensitization. In contrast, an increase in endothelin B receptor expression was observed in female rats correlating with behavioral de-sensitization. This study shows long term alterations in endothelin B receptor expression and pain sensitivity in rats exposed to ET-1 early in development.

THE EFFECT OF MUTATED ZNF161 ON THE EXPRESSION OF DOCK7, STMN1, ARHGAP22, AND RHOB GENES

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Advisor: Dr. Bhuvana Parameswaran

ZNF161 gene codes for a protein containing zinc ions. These zinc ions allow the protein to bind to specific base sequences on the DNA strand. Zinc Finger 161 protein functions as a transcription factor that controls the expression of various genes. Four genes that are linked to the transcription of ZNF161 protein are DOCK7, STMN1, ARHGAP22, and RHOB. The purpose of the experiment was to determine whether a mutated ZNF161 gene in a patient effected the expression of their DOCK7, STMN1, ARHGAP22, or RHOB gene. Several protocols of Polymerase Chain Reactions (PCR) analyzed by computer programs were done to determine the expression of the patient's genes in comparison with normal (control) people's genes. The mutated ZNF161 had no effect on the expression of DOCK7. STMN1 showed slightly low, but close to normal expression. Expression of ARHGAP22 and RHOB in the patient could not be determined.

THE RETINA AS A MODEL SYSTEM FOR DRUGS OF ABUSE

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Advisor: Dr. K. Sris

Drug addiction is correlated with changes in neural activity in several densely interconnected parts of the brain. However, the main cellular and molecular targets of drugs of abuse are present very early in the visual pathway from eye to brain, i.e., in the retina. Since there are no feedback projections from the brain back to the retina, the retina does not contribute to the induction or maintenance of drug addiction. However, it does possess molecular targets of addictive drugs. Therefore, the retina is a good model for determining the effects of drugs of abuse. To facilitate the eventual testing of this hypothesis, a quantitative real-time assay of retinal function, the spatio-temporal receptive field map of individual retinal ganglion cells in the intact living animal was generated. Action potentials were recorded from single retinal ganglion cells for up to 5 hours. The spatio-temporal receptive field was mapped upon increasing levels of Isoflurane anesthesia. The results indicate that retinal ganglion cell firing rates and receptive field profiles were markedly resistant to increasing doses of anesthetic (from 1% to 3.5% Isoflurane). Even when firing rate was eventually compromised (with 4% Isoflurane), the retinal ganglion cell receptive field size, shape and sign were virtually indistinguishable from that obtained with lower doses of anesthesia. Therefore, this technique of direct electrophysiological recording from individual retinal ganglion cells in the intact animal is very robust under a variety of conditions. It is expected that this approach will provide the most detailed measurements of the modification in sensory processing upon the administration of a variety of addictive drugs.

ACCURACY OF CALCULATED DAMPING RATIOS USING THE EIGENSYSTEM REALIZATION ALGORITHM

Latoya Dixon, SC Governor's School for Science and Mathematics
Mentor: Dr. Juan Caicedo, University of South Carolina Columbia
Advisor: Dr. Mark A. Godwin

In this research the accuracy of measuring damping with the Eigensystem Realization Algorithm (ERA) is explored. The method is applied to acceleration records of a one story model building excited by a bench scaled earthquake simulator. Two types of excitations are considered: free vibration and random excitation. A benchmark ratio is obtained from the free vibrations by averaging the manually calculated damping values of both free decay and random excitations. The Natural Excitation Technique (NExT) is used with the ERA for the case of random excitation. Here, the random data is resampled and then converted to free-like data using the NExT program. Then, the ERA program is used to calculate the natural frequencies as well as the damping ratios. The correlation between length of the sampling period and accuracy of calculation was investigated. Results show that using the free decay excitations, the ERA program has a consistent estimation and consistent estimation when compared with the benchmark. However, the combination of ERA and NExT using random excitation significantly underestimates the damping ratios. Increasing the length of the random records does not show increase in precision.

THE PREDICTION OF AIRCRAFT COMPONENT FAILURE BY USING VIBRATION ANALYSIS

Todd A. Eisenberger, SC Governor's School for Science and Mathematics
Mentor: Dr. Abdel Bayoumi, University of South Carolina Columbia
Advisor: Dr. K. Sris

Aircraft maintenance has two primary forms. The first method is to wait for a component to fail and then repair or replace it. The second is a time-based model, in which components are replaced after a period of time statistically determined from previous experiences. The goal of this project is to reduce unnecessary part replacement by using recorded vibrations of the parts over time to predict when a specific component will fail. Our project integrates historical maintenance data gathered through the Unit Level Logistic Support Aviation system (ULLS-A) with new data from the Health and Usage Monitoring System (HUMS). The ULLS-A data consists of maintenance logs produced by the aircraft maintainers as well as maintenance expense logs while the HUMS data is composed of maintenance data gathered by a HUMS system, such as a Modern Signal Processing Unit (MSPU) or a Vibration Management Unit (VMU). With the combined data, a mathematical model is expected to be found that can predict when a particular component will need to be repaired or replaced. The project also aims to demonstrate how HUMS and ULLS-A can be used to provide more reliable maintenance practices. The project expects to extend the life of aircraft components and demonstrate the monetary benefit of the systems through a the cost-benefit analysis on the installation and use of them.

FLUORESCENCE METHODS OF DETECTING HEAVY METALS IN SOLUTION

Christopher Jordan Floyd, SC Governor's School for Science and Mathematics

Mentor: Dr. Kirk E. Dineley, Francis Marion University

Advisor: Dr. Phelesia Jones-Cooper

Metals such as Zn^{2+} are known to be present in cells, but their roles within the cell are not widely known. Fluorescent ionic probes have broadened our understanding of cell biology and the relevance of metals such as Ca^{2+} and Zn^{2+} . One key issue with these ionic fluorophores, however, is that they are not completely selective for their specific metal. Thus, heavy metal contamination often skews results and causes slightly false readings in a spectrofluorophotometer. Zn^{2+} and Cd^{2+} exhibit very similar chemical behavior, and, thus, are very difficult to distinguish in solution, especially because of frequent Zn^{2+} contamination. We investigated the spectral responses shown by FluoZin-3™, fura-2, fura-2FF, mag-fura-2, Calcium Green-5N™, and Newport Green™ to design a method for differentiating between Zn^{2+} and Cd^{2+} in solution. After receiving favorable results from mag-fura-2 and Calcium Green-5N™, these two were tested at the same time and the spectral response to increasing concentrations of Zn^{2+} and Cd^{2+} was noted. This gave us a model with two different methods for distinguishing between the two metals in solution: the isosbestic point of the ratiometric probe and intensimetric response of Calcium Green-5N™. After the addition of biologically relevant Ca^{2+} and Mg^{2+} , our dual dye model still gave definitive results. In this final medium, Cd^{2+} had an isosbestic point of 356 nm with mag-fura-2 and a strong response to Calcium Green-5N™ at the nanomolar level, while Zn^{2+} showed an isosbestic point of 345nm with mag-fura-2 and a weak Calcium Green-5N™ response at nanomolar and micromolar concentrations.

DENDRITIC SPINE FORMATION IN THE PRELIMBIC CORTEX IN FETAL ALCOHOL RATS

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Mentor: Dr. Sandra Kelly, University of South Carolina Columbia

Advisor: Dr. Murray H. Siegel

Fetal Alcohol Spectrum Disorder (FASD) includes all conditions caused by alcohol exposure during pregnancy including the most severe form, Fetal Alcohol Syndrome (FAS). Cognitive effects have been the focus of study for many years, but recently, social deficits in FASD have been reported to be severe. Rat models are used to control influences of socioeconomic status, parental care, and genetics. Studies have shown that alcohol affects social behavior and therefore may affect the prefrontal cortex (PFC) or prelimbic cortex in rats, which is one of the neural structures involved in underlying social behaviors. We hypothesize that the dendritic spines in the PFC will be altered by alcohol exposure. Past studies have shown that ethanol-exposed rat brains have more immature dendritic trees and spines in other brain regions. For this study, nontreated control (NC) rats, intubated-control (IC) rats, and ethanol-treated (ET) rats were used. The IC rats were intubated with a maltose-dextrin solution to control for the stress of the intubations and the calories of ethanol. The NC rats were only weighed. The ET rats were intubated with ethanol everyday from gestational day (GD) 1 through 22 and postnatal day (PD) 2 through 10, a period equivalent to the three trimesters in humans. The brains were then collected at PD 12 and stained by the Golgi-Cox. The dendritic trees and spines were then able to be observed with a microscope and analyzed for spine shape and number.

A PREVIOUSLY UNRECOGNIZED SPECIES OF *MYSTACIDES* (TRICHOPTERA:
LEPTOCERIDAE) IN EASTERN NORTH AMERICA

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Advisor: Dr. Murray H. Siegel

Based on adults, *Mystacides sepulchralis* (Walker) has been reported from throughout northern and eastern North America. However, an anomalous larva in the East has suggested that a new, unnamed species occurs there. Adult and larval specimens of "*Mystacides sepulchralis*" from existing collections as well as specimens recently found in freshwater creeks in the Carolinas were morphologically examined. Subtle characters in males and females were found that are consistently correlated with the conspicuous larval characters. These differences suggest a new species, previously unknown to man, occurs in this region. It was named *Mystacides atratus*. The consistent characters of this new species are described and illustrated.

EFFECTS OF RUNNING WATER OVER A PHOTOVOLTAIC PANEL

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Mentor: Dr. Roger A. Dougal, University of South Carolina Columbia

Advisor: Dr. Mark A. Godwin

During the process of converting solar energy into electrical energy, photovoltaic cells generate excess heat. This heat results in a decrease in the efficiency of the panels, decreasing the total electric energy produced by the panel. Photovoltaic cells operate more efficiently at lower temperatures due to the decrease of energy lost to heat. Cooling a solar panel may help increase the efficiency of photovoltaic panels, increasing the amount of sunlight that is transformed into electrical energy. One such way of cooling photovoltaic panels may be to run water over the face of the panel. By running water across the surface of the cells, heat will be leeched from the surface of the panel much like sweat leeches heat off of flesh. After absorbing some of the heat generated by the panel, the water can simply continue to run off the panels, removing heat from the system. However, running water over a photovoltaic cell can have adverse effects. Photons of light could be reflected or absorbed because of the water, decreasing the energy output of each cell. The objective of this research is to determine whether or not this loss of energy will create significant changes in the overall effectiveness of the panels and if running water is a viable method of cooling. A solar panel will be examined under different conditions to test if cooling by running water over the face of the cells increases power output over time. The temperature of the panel and power output will be monitored over a duration with and without the water running. This will help conclude if running water over a solar panel will make a solar panel more efficient, or if the reflection and absorption caused by the water will negate the affects of cooling the panel.

CLEANING METHODS AND PREPARATION OF CERIUM OXIDE FILMS ON
SILICON/SILICON OXIDE SUBSTRATES

Will Gunter, SC Governor's School for Science and Mathematics

Mentor: Dr. Jian Luo, Clemson University

Advisor: Dr. Murray H. Siegel

This project's goal was to find the best method of film preparation for Cerium Oxide films on Silicon Oxide substrates. The first step of film preparation was to clean the substrate. The most effective method was found by a combination of several popular cleanings. Once the substrates were properly cleaned, Cerium Oxide films were prepared

on the Silicon Oxide using a NIMA dip-coater. The dip-coater was used and the Successive Ionic Layer Adsorption and Reaction method was performed to coat the substrates. An optical microscope was used to observe the basic characteristics of the Cerium Oxide films. Also, the Scanning Electron Microscope at the Advanced Materials Research Laboratory was used to check surface morphology and cross-section thickness.

EVALUATION OF COMPOST TEA AS TREATMENT FOR EARLY BLIGHT OF TOMATO

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Mentor: Dr. Geoff Zehnder, Clemson University

Advisor: Elizabeth L. Bunn

As sustainable organic crop production becomes more prominent and fungal resistance lessens the effects of chemical fungicides, it becomes important to test the effectiveness of options available for organic disease control. The aim of this experiment was to determine if compost tea shows significant antifungal activity, specifically as treatment for Early Blight, a tomato disease caused by the fungus *Alternaria tomatophila*. Compost tea was tested as an anti-fungal foliate spray against the commercial biofungicides Serenade Max and Sonata. Compost tea was also tested in tandem with each biofungicide. Five weeks of evaluation did not produce conclusive results. However, after both the continuation of field trials for nine more weeks, and the addition of greenhouse trials for eight weeks, plants treated with compost tea showed significantly less mean disease than those treated with a water control.

THE EFFECT OF FIBROBLAST GROWTH FACTOR ALONG WITH HEAT-SHOCK FACTOR 2 AND SIGNALLING TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 1 ON OSTEOCLAST DIFFERENTIATION

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

Advisor: Dr. Bhuvana Parameswaran

Osteoclasts are bone-resorbing cells present in the human body. Excess osteoclast activity results in bone diseases such as osteoporosis, which affects 50% of women over age forty five. RANK Ligand signaling molecule, released by bone-forming cells, osteoblasts, is critical for osteoclast formation and bone-resorbing activity. The purpose of this study was to determine the processes by which RANK Ligand production is regulated in osteoblast cells. This was determined by i) testing RANK Ligand expression levels in cells after exposure to growth factors such as Fibroblast Growth Factor-2 (FGF-2) ii) confirming the presence of an HSF2/STAT1 interaction in the RANK Ligand cascade. Western Blot analysis was done to determine the answers to both the research goals using actin as a control. Western Blot analysis indicated that FGF2 enhanced RANK Ligand expression. It was also determined that the Heat Shock Factor-2 (HSF-2) protein binds to the STAT1 transcription factor present within the osteoblast cell through immunoprecipitation. Further research is needed in order to understand the role of these proteins in the cascade of reactions leading to RANK Ligand expression.

LASER ASSISTED BIOLOGICAL PATTERN DIRECT WRITING OF *E. COLI* CELLS

Nabiha F. Hossain, SC Governor's School for Science and Mathematics

Mentor: Dr. Yong Huang, Clemson University

Advisor: Dr. Murray H. Siegel

Cell printing in recent years has found recognition as a ground-breaking advance in tissue engineering, and has sparked debate as to whether it could be used to create whole tissues and perhaps even entire organs. Many studies have shown the versatility in using a modified laser-induced forward transfer technique to print biological materials ranging from active proteins and living mammalian cells to individual tissue cells. The goal of this project was to demonstrate that Matrix-Assisted Pulsed Laser Evaporation Direct Write can be used to print viable *E. coli* cells. MAPLE DW is a jet-based approach, and a modified LIFT technique. It has three basic components: a pulsed laser source, a target from which biomaterial is printed, and a computer controlled (CAD) or computer aided manufacturing (CAM) receiving substrate that catches the printed material. A laser with a wavelength of 193 nm was used, at different levels of fluence and at different frequencies to write cells from a UV transparent slide onto a substrate. The cell viability of the *E. Coli* cells, a measure of damage to the cells, was calculated by dividing the estimated number of living cells written by the estimated total number of cells written onto the substrate. This study has found that Matrix-Assisted Pulsed Laser Evaporation Direct Write can be used successfully to print living cells.

VALIDATION OF THE SENSOR*FRESHQ*'S ABILITY TO DETECT FRESHNESS USING THREE PACKAGING METHODS

Caleb J. Hughes, SC Governor's School for Science and Mathematics

Mentor: Dr. Kay Cooksey, Clemson University

Advisor: Dr. Phelesia Jones-Cooper

The purpose of the experiment is to validate the effectiveness of a new product, *SensorfreshQ*, and its ability to detect the freshness of beef and poultry through a sensor that detects amine byproducts of bacteria. The results that the sensor reached in determining the samples' freshness were compared with regular, unaided human sensory tests using reason based on the senses of smell and sight. Three separate methods of meat packaging were tested. After five weeks of testing, results were collected using the *SensorfreshQ*, a colorimeter, and microbial sampling using colony counting and plate agar. Our results have proven that the *SensorfreshQ*'s abilities to detect freshness with some packaging methods was less effective than a regular sensory analysis, and have produced inconclusive results with methods such as modified atmosphere packaging.

EVALUATION OF WIRELESS COMMUNICATION ALTERNATIVES FOR USE IN INTELLIGENT TRANSPORTATION SYSTEMS

Joshua H Hughes, SC Governor's School for Science and Mathematics

Mentor: Dr. Ronnie A. Chowdhury, Clemson University

Advisor: Mrs. Elizabeth L. Bunn

The research was conducted with the goal of determining which method of wireless communication would be most beneficial for implementation in Intelligent Transportation Systems (ITS) used to aid drivers. To determine the efficiency of a system, factors such as cost of implementation and maintenance, range of data transfer, rate of data transfer, flexibility, transmitted data accuracy, and bandwidth limitations were considered. Several

systems were compared based on the criteria by compiling information from various sources. The results show an area radio network to be the most currently viable and cost effective system of communication for use in an ITS program.

THE USE OF FLAVONOIDS AS CHEMOTHERAPEUTIC AGENTS AGAINST C6 GLIOBLASTOMA CELL LINE

James Hyun, SC Governor's School for Science and Mathematics
Mentor: Dr. Swapan K. Ray, Medical University of South Carolina
Advisor: Dr. Bhuvana Parameswaran

Glioblastoma is a lethal and prevalent malignant brain tumor in humans. About 60 % of patients diagnosed with this tumor do not survive. The three common methods of treatment are surgery, radiation therapy, and chemotherapy. Flavonoids are natural nutrients found in vegetables, fruits, and some plant-containing drinks. They are known to have chemotherapeutic effects on cancerous cells, especially by apoptotic cell death. Those that are chemically synthesized in labs are known to achieve better effect as drugs. In this project, C6 Glioblastoma cells were treated with 100 μ M concentration of various flavonoids, which include 3',4'-DMF, 5,7-DMF, 5,7,4'-TMF, Apigenin, and Galangin, all chemically synthesized in labs for use as chemotherapeutic agents. To test the efficacy of the flavonoids, a series of tests were performed, which include: (i) Wright Staining (ii) ApopTag Assay (iii) Western Blot analysis for protein activity (iv) Caspase-9 and Caspase-3 Colorimetric Assay. Wright Staining and ApopTag Assay confirmed that the cells underwent apoptosis. Western Blot analysis indicated the expression of proteins such as Caspase-3 and Bcl-2, which were active in the apoptotic process. The Caspase Colorimetric Assay verified that Caspase-9 and Caspase-3 were active in apoptosis of the C6 cells. In summary, flavonoids have chemotherapeutic effects in apoptosis of C6 Glioblastoma cell lines, and the flavonoid Apigenin worked the best in most cases.

FLUORESCENCE OF PEG-FUNCTIONALIZED CARBON NANOTUBES

Sarah Jones, SC Governor's School for Science and Mathematics
Mentor: Dr. Ya-Ping Sun, Clemson University
Advisor: Dr. Phelesia Jones-Cooper

If single-walled carbon nanotubes (SWNT) and multi-walled carbon nanotubes (MWNT) are functionalized with O,O'-Bis(3-aminopropyl)polyethylene glycol (PEG), they will show significantly greater fluorescence than their pure counterparts. Carbon nanotubes (CNT) are graphite cylinders of about 10 nm diameter and have fluorescent properties when functionalized with an oligomer. They also become water-soluble after functionalization. SWNT and MWNT were purified via nitric acid reflux to add carboxylic acid groups to the defective areas of the CNT. The CNT were functionalized with the oligomer PEG, and fluorescence was tested. It was found that the PEG-functionalized CNT were significantly more strongly fluorescent than the pure CNT. The MWNT fluorescence was stronger than that of the SWNT, so the MWNT was successfully functionalized (the lab had conducted similar experiments previously and found the MWNT and SWNT fluorescences to be equal). Functionalized CNT show greater fluorescence than pure CNT. Someday, CNT may be used medically by injecting it into the body and binding to tumors. With their greater fluorescence, they will make tumors easier to see with less expensive imaging equipment.

CHARACTERIZATION OF PDEF MEDIATED uPA REGULATION IN BREAST CANCER CELLS

Anne Darby Kirven, SC Governor's for Science and Mathematics
Mentor: Dr. Dennis K. Watson, Medical University of South Carolina
Advisor: Dr. Bhuvana Parameswaran

Invasiveness is a significant event that must occur during the process of metastasis in cancer. Prostate-derived Ets factor (PDEF) is a transcription factor associated with inhibiting metastatic progression in various cancer cells (1). PDEF is expressed in noninvasive cancer cells while it is lost or reduced in invasive cancer cells (2). Re-expression of PDEF into invasive cancer cell lines also shows an inhibition of metastatic traits (3). Another protein called Urokinase-type plasminogen activator (uPA), a serine protease, also shows up-regulated expression in invasive cancer cell lines and is present in low or undetectable levels in noninvasive lines (4). Previous research has demonstrated that PDEF binds specifically to the uPA promoter and causes the down regulation of uPA mRNA and protein (5). The aim of this research is twofold: 1) to determine if the stably transfected uPA gene is stably expressed in both noninvasive and invasive breast cancer cells as well as its effects on these cells and 2) to determine the expression and effects of stable exogenous PDEF gene added to stably transformed uPA cells. Western blot analysis, Real-Time Reverse Transcriptase Polymerase Chain Reaction analysis, and immunoprecipitation experiments showed that both uPA RNA and uPA protein expression in the stable uPA cell transfectants. Metastatic functional effects such as cell growth, migration, and wound assays also showed an increase in the presence of uPA. Phenotypic rescue experiments with exogenous PDEF demonstrated that when PDEF is re-expressed in invasive cancer cells, there is an inhibition of migratory properties.

THE PRODUCTION OF MUTANT FORMS OF PROSP-C

Hyunjin Kwon, SC Governor's for Science and Mathematics
Mentor: Dr. John E. Baatz, Medical University of South Carolina
Advisor: Dr. Clyde J. Smith

Pulmonary surfactant is a complex mixture of proteins and lipids that is essential to proper lung function, as it reduces surface tension in the alveoli to prevent lung collapse. Surfactant is packaged as onion-like structures called lamellar bodies. When the lamellar bodies are directed to the Type II cell surface, the lamellar bodies unravel to form a lattice network called Tubular Myelin, which stores the surfactant in the airspace. Before the surfactant proteins SP-B and SP-C are secreted into the airway, larger, unprocessed forms exist in the alveolar cells that are called proSP-B and proSP-C. Mutations in the genes that code for surfactant proteins proSP-B or proSP-C can be fatal or cause interstitial lung disease in infants. These mutations alter the amino acid sequences of the proteins, and thus, alter their functions. We hypothesize that one of the functions of proSP-C is to "chaperone" the appropriate proteins that are required for production of lamellar bodies with correct surfactant composition. To test this hypothesis, specific mutants of proSP-C with amino acid substitutions at key regions in the proSP-C amino acid sequence must first be made. The goal of my project was to produce mutant forms of proSP-C, which was performed by site-directed mutagenesis using insect-specific baculovirus and insect cells. Producing the mutant forms of proSP-C will later allow us to test the mutants' effects on surfactant and lung function.

ELECTRICAL CHARACTERIZATION OF INDIUM NITRIDE NANOWIRES

Luis Liang Bo Lazo del Sol, SC Governor's for Science and Mathematics

Mentor: Dr. Goutam Koley, University of South Carolina Columbia

Advisor: Dr. Clyde J. Smith

Indium nitride (InN) nanowires (NW) have been synthesized in a horizontal quartz-tube furnace through direct reaction between metallic In and NH_3 using nitrogen as the carrier gas. Thin film of Au on SiO_2/Si substrate has been used as the catalyst layer, facilitating vapor-liquid-solid (VLS) growth of the nanostructures. VLS mechanism is currently the most common growth method used, but it randomizes the direction of the nanowires as they grow. Once InN nanowires were grown, they were separated from the substrate by placing them into a solution which was affected by ultrasonic waves. The nanowires then fell off into the solution and harvested onto another substrate with electrical contacts, forming field effect transistors (FETs) with back-gated configuration. Electrical bias was applied to measure the current-voltage characteristics (I_d - V_d and I_d - V_g curves) of the NW based FETs.

The present project involved the electrical transport measurements of the FETs and calculations of the electron mobility and carrier concentration of the nanowires. Using an AFM, the I-V curves of the NW based FETs have already been investigated under variable back-gated bias. The mobility and carrier concentration of the NWs were then calculated based on the I-V curves. The gate-bias dependent mobility of the NWs ranged from $50 \text{ cm}^2/\text{Vs}$ to $250 \text{ cm}^2/\text{Vs}$, and their carrier concentration was $\sim 10^{18} \text{ cm}^{-3}$.

BUILDING AN AUTOMATED MODEL OF A WHEELCHAIR OUT OF LEGOS THAT WILL TAKE OUT THE TRASH

Rachel A. Lucas, SC Governor's for Science and Mathematics

Mentor: Dr. George Rudolph, The Citadel

Advisor: Elizabeth L. Bunn

The goal of this project is to determine the feasibility of modifying an electric wheelchair to use an attachment that would allow it to take out the trashcan. In order to program the attachment, examination and comparison of available computer languages was conducted. The addition of a gripper attachment and additional motors to the wheelchair were determined to be necessary for the project. The wheelchair is to navigate itself throughout the house, picking up the trashcan, going outside, dumping the trashcan off, and bringing the trashcan back to where it was, then return to its home base. As this was the prototype of the model, the Lego Mindstorms NXT kit was used to build the wheelchair/extension.

THE USE OF BOVINE FOLLICULAR FLUID AND FETAL CALF SERUM AS SUPPLEMENTS FOR BOVINE OOCYTE *IN VITRO* MATURATION

Michael Harris Lucius, SC Governor's School for Science and Mathematics

Mentor: Dr. John R. Gibbons, Clemson University

Advisor: Dr. William C. Alexander

The purpose of this project was to determine if bovine follicular fluid (FF) would be an acceptable alternative to fetal calf serum (FCS) as an additive in Tissue Culture Medium 199 for the maturation of bovine oocytes. The follicular fluid aliquots were divided into two groups, one of fluid taken from follicles of less than six mm and one of fluid taken from follicles of greater than six mm. Maturation media was prepared in three different 500 ml wells with either FCS, >6 mm FF, or <6 mm FF as a supplement. Each well received an equal number of oocytes and were allowed to incubate for 22 h at 37°C in 5%

CO₂ and air in 100% humidity. Oocytes were then evaluated for the stage of maturity by determining the presence of a polar body using a Hoechst stain (33342) under ultra violet light. The results of this research showed the FF of less than 6 mm and FF of greater than 6 mm were both equally effective in terms of bovine oocyte maturation as FCS.

CHARACTERIZATION OF THE OVERLAPPING FUNCTIONS OF THE FERRIC REDUCTASES FRO2 AND FRO3

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Mentor: Dr. Erin Connolly, University of South Carolina Columbia
Advisor: Dr. Bhuvana Parameswaran

Improving the mineral content of plants presents scientists with many obstacles. In order to increase iron concentration in the edible part of plants we must first understand the functions of each of the genes involved in iron metabolism. In this project we worked with *Arabidopsis thaliana*, a dichotic plant in the Brassicaceae family. There are a total of eight FRO genes in the *Arabidopsis thaliana* genome. The FRO family of genes encode the enzyme ferric reductase which is involved in iron uptake in the plant. The FRO2 gene is expressed in the epidermal layer of roots and flowers and possibly in the vascular tissue of roots. The FRO3 gene is expressed in the vascular tissue of roots, shoots, leaves, and flowers. In this project experiments were performed to uncover overlapping functions for the FRO2 and FRO3 genes in *Arabidopsis thaliana* using a *fro2fro3* double mutant plant. To this end, work was done to identify plants that carry mutations in both FRO2 and FRO3. Plants positive for a *fro3* mutation were selected but the lab was unable to identify plants also carrying the *fro2* mutation.

THE EFFECT OF SUBSTRATE RIGIDITY ON STEM CELL DIFFERENTIATION

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Mentor: Xuejun Wen, Clemson University
Advisor: Bhuvana Paramaswaran

Due to the unique characteristics of stem cells, such as self-renewal and the capability to differentiate into multiple cell lineages, stem cells are a promising candidate for the treatment of many Diseases and Injuries. Adult mesenchymal cells (MSCs) derived from bone marrow are a good source due to their highly proliferative nature in addition to their ability to differentiate into specialized cell types. Confirmed differentiation potential includes the differentiation of MSCs to bone, cartilage, and fat tissues. It may be advantageous to use a scaffold as a carrier for stem cell transplantation in tissue repair. To select Appropriate scaffolds need to be tested for their bioactivity and mechanical properties that affect the tissue regeneration processes of these stem cells. The aim of this project is to investigate how the mechanical properties, such as the stiffness of the scaffold that affect the differentiation of these MSCs. A series of extracellular matrix (ECM) in biocompatible hydrogels were used to test this hypothesis. The model hydrogel is based on thiol-functionalized hyaluronan (HA-DTPH) and thiol-functionalized gelatin (Gtn-DTPH), which may be cross-linked with varying concentrations of poly(ethylene glycol) diacrylate (PEGDA). An AR- 1000 rheometer was used to test the mechanical properties of the hydrogel. Mesenchymal stem cells were then seeded on the surface of these hydrogel and cultured under differentiating conditions. Flow cytometry, Reverse Transcriptase – PCR, and immunocytochemistry were used to characterize stem cells

and their differentiation. Flow cytometry and immunochemistry results indicate that osteoblastic differentiation occurred at higher concentration of PEGDA while adipogenic differentiation occurred at lower concentration of PEGDA.

SILOXANE AND ITS EFFECT ON THE OXYGEN REDUCTION REACTION (ORR) IN HYDROGEN FUEL CELLS

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Advisor: Mr. Randy LaCross

Hydrogen fuel cells show the most promise to replace the internal combustion engine (ICE) in modern automotive applications. It has the advantage of being one of the most efficient fuel sources; it runs at >50% efficiency in comparison to 33% for the ICE (Holland, 2003). In addition, a fuel cell is non-polluting, as its main by-product is water. However, a single fuel cell doesn't supply enough power to meet energy demands. To produce enough power, fuel cells are stacked together. Silicon seals are used to prevent fuel leakage from the cell stack. These seals have been shown over time to disintegrate and lead to cell poisoning. It has been noted that silicon leakage doesn't affect the anode's oxidation reaction, but halts the oxygen reduction reaction occurring on the cathode. To simulate the effect of silicon on the fuel cell, siloxane was used. This is an organic, silicon-based compound that comes in the form of a powder that simulates how silicon affects the fuel cell. The oxygen that reacts on the cathode side travels to the cathode via water. It is thought that the hydrophobic nature of siloxane prevents oxygen from reaching reaction sites on the cathode's catalyst thereby stopping the ORR. To test this hypothesis, siloxane is mixed with catalyst and placed on a RDE (rotating disc electrode). The RDE simulates the operating condition of the fuel cell. Electric potential levels are measured at both the disc and ring of the RDE. Monitoring these levels will quantify the rate at which the ORR is affected by siloxane poisoning. The results will help determine how the type of seal affects fuel cell performance. It was found that having siloxane present in the system during fuel cell operation retards the oxygen reduction reaction independent of concentration.

IMPACT OF WILDFIRES ON POPULATION AND SPECIES RICHNESS IN HERPETOFAUNA WITHIN THE RED CLIFFS DESERT RESERVE

J Emrys McMahan, SC Governor's School for Science and Mathematics

Mentor: Dr. William Mader, Red Cliffs Desert Reserve, St. George, UT

Advisor: Dr. William C. Alexander

In the Western United States, exotic grasses are destroying natural ecosystems by altering microclimates, competing with native vegetation, and heightening the damage caused by naturally occurring wildfires. The intrusive grasses cause the latter by increasing the size of these fires and accelerating the interval at which they recur. This immediately affects both flora and fauna, but the long term impacts have not been determined. The purpose of the project was to analyze the effects of wildfires on reptiles and vegetation several years after burning.

Populations of reptiles (including the Desert Tortoise, *Gopherus agassizii*) and vegetation were surveyed in both burned and unburned regions of the Red Cliffs Desert Reserve, a transition zone that lies between the Great Basin, Mojave Desert, and Colorado Plateau in Southwestern Utah. The population size and species richness of the two groups were then compared to determine the influence of fire on biodiversity. In both cases, fire significantly reduced both the number of individuals and number of species observed.

EFFECT OF CLAY CONTENT AND PH ON THE MECHANICAL AND BARRIER PROPERTIES OF FISH GELATIN/ MONTMORILLONITE NANOCOMPOSITE FILMS

Joseph G. Miller, SC Governor's School for Science and Mathematics
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Advisor: Dr. K. Sris

Fish Gelatin has received much attention as a packaging material in the recent past due to the burning of plastic becoming an environmental concern. The mechanical and water vapor and oxygen barrier properties of fish gelatin are not as strong compared to mammalian gelatin. However, these barrier and mechanical properties can be strengthened with new nanocomposite technology. The purpose of this experiment was to determine the effect of pH and clay content on fish gelatin/nano-clay films. After testing, it was found that adding 5% nanoclay (w/w) increased tensile strength from 30.31 ± 2.37 MPa to 40.71 ± 3.30 MPa. However, the 9% (w/w) improved oxygen permeability from 25.99 ± 0.05 $\text{g}^*\text{m}^*\text{um}/100\text{in}^{**}\text{day}$ to only 7.38 ± 1.05 $\text{g}^*\text{m}^*\text{um}/100\text{in}^{**}\text{day}$. The water vapor permeability also decreased with 9% clay (w/w) from 274.50 ± 14.05 $\text{g}^*\text{m}^*\text{um}/100\text{in}^{**}\text{day}$ to 71.13 ± 5.51 $\text{g}^*\text{m}^*\text{um}/100\text{in}^{**}\text{day}$. Overall, the clay content improved both mechanical and barrier properties of the fish gelatin films.

EFFECT OF PH ON THE BACTERIA COUNT OF DIPS CONTAMINATED BY "BITE DIPPING"

Chloe Moore, SC Governor's School for Science and Mathematics
Mentor: Dr. Paul Dawson, Clemson University
Advisor: Dr. Clyde J. Smith

This project investigated the effect of pH on the bacterial count of dips contaminated by bite dipping. Bacteria growth was observed for 3 kinds of typical dips after the transfer of human saliva through the act of dipping, biting and re-dipping a cracker. Three common dips with approximate pH's of 4, 5 and 6—salsa, chocolate, and cheese—were chosen to be imitated and tested. Peptone water was adjusted to the three pHs using citric acid. Samples taken from each pH were used as the dipping solution for each replication of the experiment. The experiment was performed with 9 different subjects, each using three dipping treatments; 1. No dipping, 2. Dipping without biting, and 3. Dipping after biting. The dips were sampled at 0 and 2 hours after dipping and the plates incubated for 2 days before the colony forming units were counted and recorded. The averaged replications, pH levels, sampling times and dipping treatments were included in a general linear model with the following interactions: pH by dipping treatment, time by dipping treatment, and pH by time by dipping treatment. Statistical analysis showed few differences in bacteria count when subjects did not bite the cracker before dipping. However, samples that were used for dipping the bitten crackers displayed a significant ($P < 0.05$) increase in bacteria population of the dipping solution as the pH of the solutions increased as well as a significant decrease in the bacteria on the pH 4 and 5 plates over the holding time of two hours.

MICRODISSECTION OF MICE TISSUE USING THE MEDIMACHINE

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Advisor: Dr. Bhuvana Parameswaran

One of the key research methods being used in the fight against cancer is Flow Cytometry, which uses lasers to identify particular markers that can be transmitted onto tissues or cells. These Markers, such as GFP, easily identify potential cancerous cells. In order to use Flow Cytometry, scientists require small pieces of tissue that are both small enough to be read and viable enough to have enough live cells. Thus, this research tested the BD Medimachine, a relatively new tissue splicing device, for its maximum efficiency. Because the machine is in its infant stage, a set protocol has not yet been produced. Lymph, lung, thymus, liver, and tumor samples were extracted from two cancerous C-57 mice, one with B-16 tumor cells and the other with TC-1 tumor cells, and the efficiency of the machine was tested by altering the time the tissue ran, the type of cells used, as well as altering the incubation period. A negative correlation between time spent on ice with viability and cell count was determined, and 10 minutes inside the machine was found to be the optimal time.

DISTRIBUTED SENSOR NETWORK FOR INCIDENT DETECTION

Austin Levi Pittard, SC Governor's for Science and Mathematics

Mentor: Dr. Ronnie Chowdhury, Clemson University

Advisor: Elizabeth L. Bunn

This project's objective is to develop and evaluate a distributed sensor network for incident detection using traffic simulations on a computer. The computer simulation will create a scenario of cars changing lanes and reducing or increasing speed on a scale model area of highway. By using a hierarchal structure of sensors implemented into the traffic simulation, communication between cars, roads, and traffic management centers will be greatly improved. This will eventually lead to fewer wrecks and less traffic congestion as these sensors help human operators assess incidents more efficiently.

REGULATION OF COX-2 GENE EXPRESSION BY PARTHENOLIDE AND CURCUMIN IN THE HUMAN HT-29 COLON CANCER CELL LINE

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Mentor: Dr. Chin-Fu Chen, Clemson University

Advisor: Dr. Clyde J. Smith

Cyclooxygenase-2 (COX-2), an inducible inflammatory enzyme, is expressed in high levels at sites of inflammation and also colonic polyps and tumors. Non-steroidal anti-inflammatory drugs (NSAIDS) have been used to prevent and treat colon cancer but with adverse side effects because they inhibit COX-1, a constitutive enzyme, along with COX-2. Parthenolide from the feverfew plant and curcumin from turmeric are both used as natural anti-inflammatory remedies. If parthenolide and curcumin can inhibit inflammation by lowering COX-2 gene expression, they could be used as a safer treatment and prevention of colon cancer. In this experiment, the human HT-29 colon cancer cell line was treated with 2 mM parthenolide and 1 mM curcumin for periods of three hours and twenty-four hours to measure short term and long term effects. RNA was extracted from the treated cells, which was then used to run a real time RT-PCR test. Parthenolide decreased COX-2 gene expression in both the short term and long term experiments while curcumin generally increased expression for both time trials, but with no statistical

significance. After the cells were also treated with 100 ng/ml lipopolysaccharide (LPS) to further increase COX-2 expression, neither parthenolide nor curcumin showed significant regulation of COX-2 gene expression.

ENDOCRINE CHARACTERIZATION OF THE PERI-PREGNANCY ESTABLISHMENT PERIOD IN DAIRY COWS

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Advisor: Dr. William C. Alexander

This study characterized the peri-pregnancy establishment period in dairy cattle by measuring circulating progesterone concentrations in blood serum and corpora lutea dynamics between Days 15 and 24 after estrus (Day 1) in cows subjected to artificial insemination on the day of estrus. The motivation behind this study was to develop a profile for the early pregnant dairy cow that could enable farmers to detect open (and pregnant) inseminated cows before the next standing estrus period. Because luteal progesterone is required for the maintenance of pregnancy in cows, circulating progesterone concentrations were expected to remain elevated in early pregnant cows but decline sharply in open cows around Day 17 (following luteolysis) in a normal 21-day estrous cycle. Blood samples were drawn daily during the test period from a group of fifteen lactating cows that had undergone artificial insemination as well as from five non-inseminated controls, and the serum was analyzed for progesterone content by radioimmunoassay. CL diameter was calculated daily by trans-rectal ultrasound (7.5MHz probe). CL growth profiles showed no significant differences between the groups until Day 23, and progesterone concentrations showed a significant difference between pregnant cows and both non-pregnant AI cows and non-AI cows for Days 20-24. Overall, the CL dimensions seemed an unsuitable method for diagnosis of pregnancy. The serum progesterone profile obtained through this experiment, while not an economically feasible form of pregnancy diagnosis, could be helpful in future research efforts for more reliable and user-friendly detection methods. Further, this experiment provided a foundation for the development of cow-side milk/blood progesterone assays that would be inexpensive, yet sensitive enough to determine high and low progesterone concentrations during the peri-pregnancy establishment period.

EFFICIENCY OF ENTOMOPATHOGENIC NEMATODES AND NEEM OIL FOR CONTROL OF LEPIDOPTEROUS PESTS OF VEGETABLE CROPS

Luke Rogers, SC Governor's School for Science and Mathematics

Mentor: Dr. Gerald Carner, Clemson University

Advisor: Dr. Phelesia Jones-Cooper

This project consisted of both field and laboratory testing of nematodes and neem oil as pest controllers. Squash plots were arranged in a manner so as to simulate home garden conditions, treated with five combinations of *Steinernema carpocapsae* and *Steinernema riobrave* nematodes and neem oil, and monitored for yield. Squash vine borer (*Melittia cucurbitae*) was the main target pest of the field tests. The squash yield showed little difference between treatments, though neem oil alone performed best, neem oil with *S. riobrave* nematodes performed worst, and all other treatments fell between the two. Bioassays were also performed, using larvae from a laboratory-reared beet armyworm (*Spodoptera exigua*) colony. The bioassays consisted of the same five treatment types, and were monitored for mortality. Though both nematode species performed better than the neem alone treatment, *S. carpocapsae* caused higher mortalities which became even greater with the addition of neem oil.

THE EFFECTS OF HOST PLANT CHEMICAL CUES ON TACHINID FLY
PARASITISM RATES OF *DANAUS PLEXIPPUS*

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Mentor: Dr. Michelle J. Solensky, The College of Wooster

Advisor: Randall M. LaCross

Insect parasitoids in the order of Diptera include approximately 20% of the total number of species of parasitoids. The family Tachinidae in Diptera is one of the most ecologically diverse and important families. A Tachinid fly, *Lespesia archippivora*, was used as the parasitoid to the monarch host larva, *Danaus plexippus*, in the following experiment. The wide range of host diversity in *Lespesia archippivora* allows it to be classified as a generalist species. Thus not much specific information is known concerning this specific fly parasitoid's ecological and evolutionary behavior patterns or strategies. A field exposure experiment was conducted to observe the preferences of the *Lespesia archippivora* parasitoid in locating its larval host, specifically studying the effects that the chemical cues of the larval host plants had on the rates of parasitism. During the experiment, monarch larvae were released onto wild milkweed patches in two groups: half on sites with damaged milkweed plants and half on sites with undamaged milkweed plants. These larvae were exposed to potential parasitism for two days and then were retrieved from the sites. After collecting the exposed larvae from the field, the larvae were brought back to the lab and continued to be reared until the adult stage. It was observed that the parasitism rates were not correlated to the varying chemical cues emitted from the differing conditions of the plants. Limited Tachinid fly parasitoids were observed throughout the entire experiment, suggesting parasitism rates are uncommon at the time of year, or in the region in which the experiment was conducted.

EFFECTS OF CACHEXIA ON BLOOD GLUCOSE AND INSULIN LEVELS IN
APC^{MIN/+} MICE

Victor Russo, SC Governor's School for Science and Mathematics

Mentor: Dr. James A. Carson, University of South Carolina Columbia

Advisor: Dr. Kurt C. Wagner

Cachexia is a condition of cancer that causes waste of fatty tissue and skeletal muscle mass. It is known to create defects in different areas of the body's metabolism, making a change in diet unable to recover the lost body weight. The regulation of the blood glucose level could be one of the metabolic defects caused by cachexia. The purpose of this study was to determine if cachexia affects the glucose and insulin levels in *Apc^{Min/+}* mice. Blood samples were collected at 10 and 20 weeks of age for male *Apc^{Min/+}* mice (n=4) and C57BL/6 (normal) mice (n=5). Glucose and insulin levels were determined, and the [insulin] : [glucose] ratio was calculated at both time points. Intestinal polyps were counted and were correlated against glucose levels. Statistical analysis was completed using ANOVA and t-tests. Significance was set at $\alpha=0.05$. There was a significant effect of cancer on glucose and insulin levels. However, there was no effect of cancer on the [insulin] : [glucose] ratio. These data suggest that colorectal cancer may have detrimental effects on markers of glucose metabolism.

N-BODY SIMULATIONS OF A COLLISION BETWEEN THE MILKY WAY GALAXY AND THE SAGITTARIUS DWARF ELLIPTICAL GALAXY

Mary Rusthoven, SC Governor's School for Science and Mathematics

Mentor: Dr. Jeanette Myers, Francis Marion University

Advisor: Dr. Clyde J. Smith

The Sagittarius Dwarf Elliptical Galaxy (SagDEG) is a small galaxy orbiting the much larger Milky Way. In the last billion years, it has passed through the Milky Way several times. The purpose of this project was to run simulations of this collision over the past billion years to study the path that this galaxy has followed. N-body simulations were run. In some no star formation or gas affects the movement of the stars in the simulation; in these simulations, only stars and dark matter are considered. In some simulations, both the Milky Way and SagDEG evolved over time, and in some the SagDEG evolved around a static Milky Way. The calculated path over the last billion years shows the SagDEG passing through the stellar disk of the Milky Way galaxy three times before reaching today's position, slightly underneath the disk and across the galaxy's center from the Sun. Over the time it has taken to evolve to this position, the SagDEG has been stretched into a center with a high density of stars and dark matter and leading and trailing tidal tails with a much lower density. The SagDEG has also been losing stars into the Milky Way as it passes through. This has all been confirmed in preparation to run Smooth Particle Hydrodynamic models, in which star formation and gas will be included.

CO-POLYMERIZATION OF VARYING SOLUTIONS OF PYRROLE AND ANILINE FOR THE ELECTRONIC NOSE AND TONGUE

Mathew Sebastian, SC Governor's School for Science and Mathematics

Mentor: Dr. Anthony Guiseppi-Elie, Clemson University

Advisor: Dr. Murray H. Siegel

This project's goal is to create uniform co-polymer films with varying molar compositions of pyrrole and pyrrolyl-4-butyric acid or 4-(1*H*-Pyrrol-1-yl)phenol, and aniline and -Anilino-1-naphthalenesulfonic acid ammonium salt on 250 micron diameter gold electrodes set within 8-well chips. Each polymer modified electrode was used as an artificial receptor of an electronic tongue and/or nose. The gold electrode surface was modified by 1-hr incubation in cysteamine ($\text{HSCH}_2\text{CH}_2\text{NH}_2$) in DI water followed by DEC (N-(3-Dimethylaminopropyl)-N-ethylcarbodiimide hydrochloride) and sulfo-NHS coupling to pyrrolyl-4-butyric acid in an aqueous solution. Co-polymer films were prepared by electropolymerization in monomer solutions containing camphor-10-sulfonic acid at 0.750 V vs. Ag/AgCl to a fixed charge density of 2.56×10^{-5} C (50 mC/cm). Here, a pH buffer is inserted into the modified wells with the polymer films. Each well, having a different composition of pyrrole and pyrrole butyric acid, was affected differently by the buffer and can be seen by the use of the electrical impedance (ECIS) machine. These affects are the "fingerprints" for each pH buffer because each pattern of response is unique in that they all have a different resistance, and can be distinguished from other pH levels. The electronic "tongue" was used to test various pH buffers.

THE ANTI-CANCER CHARACTERISTICS OF PHOTOCATALYZED TiO₂

Summer Shelnutt, SC Governor's School for Science and Mathematics

Mentor: Dr. Jeremy Tzeng, Clemson University

Advisor: Dr. Phelesia Jones-Cooper

Titanium dioxide (TiO₂) is known to produce hydroxyl radicals when exposed to UV radiation; therefore, it can be harmful to living cells. The aim of this project was to examine the effect of UV-activated TiO₂ on different types of cancer cells. To observe this effect, cells treated with TiO₂ were exposed to UV light for 30, 60, and 120 minutes. Cell growth was monitored for four days and compared to control groups. Results indicate that UV-activated TiO₂ decreases cell viability. This information can be used in future experiments with the ultimate goal of developing methods to treat cancer with photocatalyzed TiO₂.

SENSITIVITY OF ELECTRO STATIC CALCULATIONS TO CHANGING PROBATION RADII

Michael S. Shoppell, SC Governor's School for Science and Mathematics

Mentor: Dr. Emil Alexov & Dr. Petras Kundrotas, Clemson University

Advisor: Dr. Clyde J. Smith

This study focuses on determining whether changing a specific parameter, the probation radius, of the Delphi program changes the electrostatic results. In order to do so, 262 proteins were analyzed to determine their total electrostatic contribution to binding energy (ÄÄG). Four different radii were chosen 1.4Å, 1.0Å, 0.5Å, and 0.0Å. In addition Delphi was run through four different force fields for each radii: Amber, Charmm22, OPLS, and Parse. Through analyzing the results it is apparent that changing the radii does affect the outcomes of the results. When using a smaller probation radius the ÄÄG is more likely to have a smaller value. Further, the relation between differing probation radii is a complicated dependence. Finally, calculations for smaller radii are more sensitive to a particular force field.

THE EFFECTS OF CHEMOTHERAPEUTIC RETINOIDS ON TGFB SIGNALING IN CANCER CELLS

Shilpa Sreedharan, SC Governor's School for Science and Mathematics

Mentor: Dr. Steven W. Kubalak, Medical University of South Carolina

Advisor: Elizabeth L. Bunn

Bexarotene is a synthetic retinoid that is currently under clinical trials for the treatment of various cancers. Previous experiments have shown that cancer cell lines, such as A549 (non-small lung carcinoma cells), are sensitive to Bexarotene and undergo apoptosis in a dose-dependent manner. Other cell lines, such as the T47D (mammary ductal carcinoma cells), are insensitive to its effects. It is possible that the non-responders have tumors that are distinct on a molecular level. Recent studies from the Kubalak lab have shown that treating mouse embryonic fibroblasts (NIH3T3 cells) with Bexarotene and the cytokine TGFb lead to an increased activation by means of phosphorylation of the signaling protein Smad2. A treatment of Bexarotene without the presence of TGFb had no effect on Smad2 phosphorylation. Therefore, to verify the TGFb status of the cancer cell lines, we used MLEC-SBE cells and their ability to produce luciferase. The results from this experiment showed that the cell lines did not produce measurable amounts of TGFb. A Western Blot was then conducted to determine the amount of pSmad2 and total Smad2 produced in both cell lines. The results from the Western Blot were not as expected; we found that the addition of retinoids to a TGFb treatment blunts

the phosphorylation of Smad2. There is Smad2 present in the T47D cells, but it is not phosphorylated when treated alternately with diluent, TGFb, TGFb + 9-cis Retinoic Acid (retinoid), and 9-cisRA.

THE EFFECTS OF PYRIDOXAMINE ON THE CONCENTRATION OF INSULIN AND GLUCOSE IN THE BLOOD OF C57/BL6 MICE

Chavis Stackhouse, SC Governor's School for Science and Mathematics

Mentor: Dr. James A. Carson, University of South Carolina Columbia

Advisor: Dr. Kurt C. Wagner

Nutrition is an important factor in the prevention of certain diseases, such as diabetes mellitus. Many companies offer supplements to aid in maintaining a well-balanced diet, but many supplements haven't been adequately tested to determine their full effects. For example, it has been recently discovered that pyridoxamine, a form of vitamin B6, prevents a few of the complications of diabetes. The purpose of this study was to determine the effects of pyridoxamine on the ratio of insulin to glucose in the blood of a mouse. Five-week-old C57BL/6 mice were divided into groups, PM (n=6) and CON (n=4). The PM group received pyridoxamine in their drinking water at a concentration of 2g/L, and the Con group received only water. Blood samples were taken from the mice after being on the treatment for four weeks. The blood was centrifuged, and the plasma removed. The plasma was then analyzed to determine glucose and insulin concentration. The ratio of insulin to glucose was determined for each group. The pyridoxamine treatment appeared to have lowered the PM groups insulin levels ($.4206 \pm .0284$ mg/dl vs. $.6126 \pm .1282$ mg/dl). The PM group also showed increased glucose levels (318.5 ± 22.42 vs. 283.3 ± 23.55). Overall, the PM group promoted the trend for a decrease in its insulin to glucose ratio. This trend approaches significance with a p-value of 0.105998 when analyzed using a two-tailed t-test with $\alpha < 0.05$. The effects of the pyridoxamine shown in the results may be viewed as evidence of pyridoxamine's improvement of the regulation of insulin and glucose. Future research should determine the effects of pyridoxamine on blood levels of insulin and glucose in other animal models.

DNA EXTRACTIONS OF BLOOD SAMPLES TAKEN FROM *AMMODRAMUS CAUDACUTUS* USING THE PHENOL/CHLOROFORM METHOD

Mark Stanton, SC Governor's School for Science and Mathematics

Mentor: Dr. Chris E. Hill, Coastal Carolina University

Advisor: Dr. William C. Alexander

The Saltmarsh Sharp-tailed Sparrow, *Ammodramus caudacutus*, lives in tidal marshes in the coastal areas of the eastern United States. Their mating system closely resembles one of scramble-competition polygyny. This system consists of males trying to reach fertile females before other males, but they do not fight openly or defend territories. Instead, they must be persistent and find fertile females before other males. Genotyping of these birds can determine the paternity and maternity of chicks, which would support or refute the mating system of the bird being scramble-competition polygyny. DNA extraction using the phenol/chloroform method was performed on 221 blood samples taken from a nesting population of Saltmarsh Sharp-tailed Sparrows in 2003 and 2004. These samples did not have a homogeneous consistency, so the method of extraction was not guaranteed to work. Out of the 221 samples, 136 were successful, which meant that they yielded a DNA concentration of at least 20 ng/ml, which is the minimum amount to be used in Polymerase Chain Reactions, which would be the next step with these samples.

ROLE FOR CERAMIDE SYNTHASE LASS2 IN GROWTH REGULATION OF KCNR NUEROBLASTOMA CELLS

Lucy Burton Stephens, SC Governor's School for Science and Mathematics

Mentor: Dr. Lina Obeid, Medical University of South Carolina

Advisor: Dr. K. Sris

Ceramide is a bioactive sphingolipid that has been implicated in regulation of cell growth, senescence, and apoptosis. Ceramide synthase is a key enzyme in the sphingolipid biosynthetic pathway, which catalyzes the formation of ceramide. In mammals, there are six isoforms of ceramide synthase (LASS1-6), and each isoform shows specificity to the chain length of fatty acyl-CoA substrate. In recent studies in our laboratory we observed that LASS2 isoform of ceramide synthase became over expressed with increasing density of KCNR neuroblastoma cells. In order to understand the relationship between LASS2 expression and cell density we are studying the effects of LASS2 down-regulation. 20 nM siRNA exposures for 48 hours were sufficient to decrease the levels of LASS2 mRNA and protein. Interestingly, down-regulation of LASS2 led to up-regulation of LASS5 and LASS6 ceramide synthase isoforms. Additionally, metabolic labeling of sphingolipids with C-17 sphingosine showed that down-regulation of LASS2 altered the in-cell activity of the different ceramide synthases. Moreover, cell cycle analysis of scramble- and LASS2 RNAi-treated KCNR cells revealed that down-regulation of the LASS2 gene induced growth arrest. These studies suggest that different ceramide synthase isoforms and ceramide species with different fatty acid chain length have differential effect on cell growth.

OUABAIN APPLICATION TO THE ROUND WINDOW OF CBA MICE: A MODEL OF APOPTOSIS IN THE INNER EAR

Molly Tansey, SC Governor's for Science and Mathematics

Mentor: Dr. Hainan Lang, Medical University of South Carolina

Advisor: Elizabeth L. Bunn

The cochlea of the mammalian ear is ultimately responsible for the ability to hear. In the cochlea several key types of cells work together to transform the mechanical energy of sound into an electrochemical message. These include hair cells, spiral ganglion neurons (SGNs), cochlear fibrocytes, and cells within the stria vascularis, which can be damaged by exposure to excessive noise or ototoxic drugs. Hair cells and SGNs are non-regenerative, and can cause permanent hearing loss. The major aim of this project was to create a model of apoptosis of these cells in mice so that both regeneration and possible stem cell transplant can be studied. Mice data is necessary because more information is known on mice genetics than gerbil genetics, and they can be used stem cell transplant experimentation. Apoptosis was induced by applying ouabain to the round window membrane, after which the mice were given different recovery times. The left ear of each mouse served as a control. Afterwards the cochleas were removed and prepared for observation. Apoptosis was observed in the SGNs and fibrocytes. In contrast to the gerbil data, where the absence of SGNs was more severe for longer application periods (Schmiedt et al., 2002), there was a relatively high number of healthy SGNs in at least one. This model of apoptosis in the inner ear of CBA mice can serve as a basis for stem cell transplantation to replace lost spiral ganglion neurons and fibrocytes located in the lateral wall.

THE EFFECTS OF SLEEP DEPRIVATION ON NEURONAL IMMUNOREACTIVITY

Hannah Van Patten, SC Governor's School for Science and Mathematics

Mentor: Dr. James Fadel, University of South Carolina School of Medicine

Advisor: Dr. Mark A. Godwin

Cognitive function is sensitive to sleep deprivation. The hippocampus is a brain structure essential for several aspects of cognition, including spatial memory and learning. One widely used test of hippocampal-dependent cognitive function is the Morris Water Maze (MWM). Here, mice were trained in the MWM then subjected to either sleep deprivation or normal sleep schedule before being retested in the MWM in order to determine if their performance was negatively affected. The mice were perfused 2 hr following MWM testing and the brains were cut on a freezing microtome. Statistical analysis revealed a trend toward impaired MWM performance in sleep-deprived mice. In order to determine the neural correlates of sleep deprivation effects on MWM performance, we performed immunohistochemistry for the neuronal activity marker protein, Fos. We combined the Fos marker protein with other markers of specific neuronal populations related to wakefulness and cognition, including orexin, choline acetyltransferase and parvalbumin. We then counted single (Fos only) or double-labeled neurons in the hippocampus, basal forebrain and hypothalamus. A trend toward decreased Fos expression in hypothalamic orexin neurons was observed in sleep-deprived mice. Analysis of cholinergic and parvalbumin neuronal populations is in progress. These studies are consistent with previous reports on the effects of sleep deprivation on cognitive function, and suggest that orexin neurons represent a target for drugs designed to maintain or enhance cognitive function during periods of sleep deficiency.

A QUANTITATIVE GROWTH MODEL FOR MICROALGAL POPULATION DYNAMICS: EXPLORING THE POTENTIAL USE OF ALGAE AS A RENEWABLE RESOURCE

Richard Voepel, South Carolina Governor School for Science and Mathematics

Mentor: Dr. Edward P. Gatzke, University of South Carolina Columbia

Advisor: Dr. K. Sris

Due to global economic and environmental conditions, fossil fuels are slowly becoming less viable as a source of energy. The cost of gasoline in the United States demonstrates that though fossil fuels may be extremely energy rich, they are not a sustainable solution to global energy needs. Alternative sources of energy are being considered world wide as a possible methods for the reduction of green house gas emissions. However, the resources required to install most alternatives prohibit widespread implementation. One type of alternative energy source can be utilized with much less difficulty; biodiesel fuel can be used as a substitute for petroleum products in many of our vehicles without extensive modification. Though traditional agricultural crops are not viable as biofuel feedstocks due to limited arable land area and energy requirements for fertilization, algae-based production holds much promise as being a suitable feedstock. The goal of this research is to create a flexible growth model for algae production systems. This work can be used to investigate production costs and operational issues for algae based biofuel production. Starting from previous research into phytoplankton and algae growth dynamics, a new model was developed that integrates multiple growth and death mechanisms. Additionally, the model includes temperature and salinity effects on the growth rate of algae. The model was verified using literature data for growth of *Chaetoceros muelleri*, a saltwater algae species which can contain more than 50% oil by mass.

THE EFFECT OF LOBELINE ON PERIADOLESCENT RATS' MOTIVATION TO ACQUIRE FOOD

Bella Wang, SC Governor's School for Science and Mathematics
Mentor: Dr. Steven Harrod, University of South Carolina Columbia
Advisor: Randall M. LaCross

Lobeline is an alkaloidal constituent of *Lobelia inflata* (Indian tobacco). Lobeline attenuates methamphetamine (METH) self-administration in adult rats and is currently being investigated as a potential pharmacotherapy for METH abuse. Little is known, however, about the behavioral effects of lobeline in adolescence, which is a period of increased vulnerability to drug dependence relative to adulthood. The present experiment determined if lobeline alters the motivation to acquire food reinforcement in periadolescent rats. Male and female adolescent rats were trained to acquire food reinforcement by lever pressing in an operant chamber. Once stable responding was observed, rats responded for food reinforcement according to a progressive ratio (PR) schedule. This schedule progressively increased the number of lever presses per reinforcer over a two-hour session. Thus, rats had to "work" harder for food as the session continued. Rats received subcutaneous injections of lobeline (0, 0.3, 0.56, 1.0, 3.0 mg/kg) five minutes prior to the operant session on the test days. The results indicate that lobeline decreased rats' motivation to lever press for food during the first thirty minutes of the test session; however, rats received a similar amount of reinforcers by the end of the two-hour test session. These results suggest that lobeline transiently decreases periadolescent rats' motivation for food. Future research should determine if lobeline also decreases rats' motivation to self-administer psychostimulant drugs of abuse such as METH and cocaine.

THE EFFECTIVENESS OF ANTIMICROBIAL NANODEVICES ON GRAM-NEGATIVE *PSEUDOMONAS FLOURSCENS*

Xiangyu Wang, South Carolina Governor School for Science and Mathematics
Mentor: Dr. Alexey Vertegel, Clemson University
Advisor: Dr. Mark A. Godwin

Pseudomonas aeruginosa is an opportunistic gram-negative bacterium that infects patients hospitalized with burns, cancer and cystic fibrosis and has a fifty percent fatality rate due to its ability to develop antibiotic resistance. This study attempted to develop an alternative way of fighting *Pseudomonas* infections through the use of antimicrobial nanodevices. The antimicrobial nanodevices were created by covalently attaching antimicrobial enzymes to 20nm aliphatic amine latex nanoparticles, then removing the non-binding enzymes. Our initial attempts to use the nanoparticles-enzyme conjugates showed that the nanodevice was effective at killing *Pseudomonas fluorscens*, a non-pathogenic version of *Pseudomonas aeruginosa*. The result also showed that plain nanoparticles were effective at killing the bacteria. The nanoparticle-enzyme conjugate with a 1:25 ratio killed nearly 94% of the *Pseudomonas fluorscens* bacteria through the use of a live/dead assay.

THE EFFECTS OF LAND DEVELOPMENT ON POPULATIONS OF THE COTTON
MOUSE, *PEROMYSCUS GOSSYPINUS*, AND ITS PARASITISM BY A BOT FLY,
CUTEREBRA FONTINELLA FONTINELLA

Tim White, South Carolina Governor's School for Science and Mathematics
Mentor: Kimberly Andrews, Savannah River Ecology Laboratory
Advisor: Dr. William C. Alexander

Human disturbance is a major impacting factor for many small mammals. This study examines the relationship between commercial land development and populations of the cotton mouse, *Peromyscus gossypinus*, and a parasitic botfly, *Cuterebra fontinella fontinella*. Mammals were captured, marked and released at four sites across Palmetto Bluff, a large development near Bluffton, South Carolina. There were 18 individual *P. gossypinus* captured, for a total of 65 captures. Findings did not correlate with results of previous research; *P. gossypinus* seemed to show no variation in abundance based on disturbance, and differences in botfly parasitism did not seem to correspond to more disturbed habitat.

RECOVERY AND SUCCESSION IN HURRICANE HUGO DAMAGED
COASTAL UPLAND FORESTS

Neil J Wilson, SC Governor's School for Science and Mathematics
Mentors: Dr. Bo Song and Dr. Chuck Gresham, Baruch Institute of Coastal Ecology
and Forest Science, Clemson University
Advisor: Dr. Kurt C. Wagner

This project is a part of a larger effort to catalogue the post-Hugo recovery and succession of South Carolina's coastal forests in four distinct areas. This project was initiated in 1994 by Clemson University and will be continued through 2017, with a thorough cataloguing of the study forests every three summers. The study sites are Hobcaw Barony, Francis Marion National Forest, Congaree Swamp National Park and Beidler Forest. The study forest in each site is divided into 20 meter by 100 meter plots and all woody stems over 2.5 cm diameter are catalogued. My study encompasses data from four plots, two in Hobcaw and two in Santee, from 1994 to 2007. All are considered Pine/Hardwood forest. I chose *Pinus taeda* for the focus of my study because of its quick growth and high abundance. So far, Hobcaw has shown an extreme growth in Loblolly Pines during the first 10 years of the study with a drop of nearly 50% in abundance between 2003 and 2007. As the pines reach a sufficient size they begin competing strongly for resources, especially light. This intense competition is what the deaths are attributed to. The Santee shows a constant growth of pines since 1994, although it is much slower than Hobcaw's rate of growth. The Loblollies have not yet reached the peak which Hobcaw so clearly showed. The hardwood populations on both sites are following a general increase through 2007.

SEXUAL DIMORPHISM OF THE DIANA FRITILLARY BUTTERFLY (*SPEYERIA
DIANA*): DIFFERENCES IN WING MORPHOLOGY

Chelsea A. Woodworth, SC Governor's School for Science and Mathematics
Mentor: Carrie Wells, Clemson University
Advisor: Dr. William C. Alexander

The Diana fritillary, *Speyeria diana*, is a threatened butterfly inhabiting the Ozarks and Appalachian mountains. The precise cause of range reduction of this butterfly is unclear. However, there are several hypotheses that may help explain reduction: habitat deforestation due to logging, loss of nectar plants, and climatic change because of global

warming (Rudolph et al. 2006). One hundred and fifty-nine pinned specimens (138 from the Carnegie Museum of Natural History and 21 from the Clemson University Arthropod Collection), were photographed and digitized using morphometric software programs: tpsUtil, tpsDig, and Morphologika2. Because this species is sexually dimorphic in size and color, it was hypothesized that there were sexual differences in wing shape as well. Statistical tests including Principal Components Analysis, which accounts for the greatest variation by centering coordinates about a common centroid, and MANOVA, a multivariate analysis of variance, showed there to be significant variation in wing shape and venation patterns between males and females.

REMODELING OF BIOLOGICAL SCAFFOLDS IN TISSUE ENGINEERING: ROLE OF MATRIX METALLO- PROTEINASES

Henry Simon Zhang, SC Governor's School for Science and Mathematics

Mentor: Dr. Dan Simionescu, Clemson University

Advisor: Dr. K Sris

Tissue Engineering uses scaffolds and cells to regenerate diseased tissues. Mechanical and tissue-derived devices currently replace pathological heart valves. These artificial heart valves have many disadvantages and a limited life span. Moreover, they cannot grow with the patient after implantation in children. Heart valve tissue engineering is expected to help overcome these shortcomings. Our goal is to create a decellularized porcine pericardium scaffold, which can set the basis of tissue, engineered heart valves. Biological scaffolds need to be biodegraded and support the formation of new matrix, characteristic of the target tissue (heart valve). Matrix Metallo-Proteinases (MMPs), enzymes capable of degrading collagen and other matrix components, are key elements involved in biodegradation of engineered tissues.

In this study, we looked at the MMP activity in collagen scaffolds by means of Enzyme Linked ImmunoSorbent Assay (ELISA) and gelatin zymography. Results showed the presence of MMP-2 in collagen scaffolds and an unknown MMP of low molecular weight. UV-crosslinking treatment was employed to control scaffold degradation. MMP activity was very low (almost undetectable) in UV-treated collagen scaffold. This shows that UV-treatment can reduce the MMP activity in decellularized collagen scaffolds. In perspective, control of MMP activity would be essential in the functional remodeling of tissue engineered scaffolds for future development of heart valves.

END

South Carolina
Junior Academy of Science
2008 Meeting Abstracts

SCJAS STUDENTS:

National Youth Science Camp

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

The application packet can be downloaded from the web site, www.sciencecamp.org. Complete information along with answers to frequently asked questions can be found at the web site. Completed applications should be sent to : Linda D. Sinclair/ State Science Consultant/Math and Science Unit/Office of Curriculum and Standards/ South Carolina Department of Education/801-H Rutledge Building/1429 Senate Street/Columbia, South Carolina 29201/lsinclair@sde.state.sc.us

SOUTH CAROLINA ACADEMY OF SCIENCE MEETING ABSTRACTS

POLITICALLY NONCONFORMING SCIENTISTS MET BEHIND THE IRON CURTAIN

Mikhail M. Agrest

Dept. of Physics and Astronomy, College of Charleston,

Contemporary inventions in science and in Physics particularly are often more exciting than science fiction fantasies of the most sophisticated writers. Life and work of scientists in contemporary world become of great interest of the public and the politicians partially because of mass destruction opportunities hidden in these inventions.

No wonder, the SCAS Mission Statement among other goals states: To improve public understanding and appreciation of science for its utilization in human progress. The gravitation to free communication and the exchange of ideas with colleagues in the world independently of their political affiliation sometimes takes over the sense of personal security. Presented paper uncovers just one page in the relationships of former USSR and US scientists of the times of Cold War. A meeting of American renowned, but young at that time American particle Physicist Thomas Howard Stix with one of the invisible Russian scientist, participant of the Russian Nuclear project, generator of extraordinary ideas and a dissident Mates M. Agrest, was documented by the KGB agent. The photographs of that meeting became available. The interest to these materials and the topic itself resulted into invitation by the History and Philosophy of Physics Committee the paper to be presented at the 2008 International AAPT meeting in Baltimore, MD, support by the College of Charleston Faculty Development Grant and also, AAPT and AIP announcement internationally: <http://www.newswise.com/articles/view/537046/> and http://www.eurekalert.org/pub_releases/2008-01/aiop-maa011808.php. Uncovering Scientific life in Russia between Rasputin and Putin might drop some light on predicting the future of the Scientific interaction of the USA and Russia.

SCAS AND SACS AAPT COLLABORATION FOR IMPROVEMENT OF THE QUALITY OF SCIENCE EDUCATION

Mikhail M. Agrest

Dept. of Physics and Astronomy, College of Charleston

SACS-AAPT - Southern Atlantic Coast Section of the American Association of Physics Teachers is a regional section of the National AAPT and it serves two states Georgia and South Carolina. SACS AAPT is implementing regionally the mission of the National AAPT that is "enhancing the understanding and appreciation of physics through teaching" Having its major focus on the HS Physics teaching SACS AAPT also is a forum for the K-12 Physical Science and Physics Teachers, 2-year, 4-tear Colleges as well as University Physics professors. Physics majors, students of all levels have their opportunity to communicate on their Physics projects and teaching.

SACS AAPT supports SCAS promoting students research and contributing to the awards for the best students research paper presented at the SCAS meeting because of the overlapping with objectives. Presented paper will discuss ways of improvement of collaboration between SACS AAPT and SCAS in achieving these common goals. The success of the principals of Service Leadership, Target Marketing and Membership Drives to serve better the objectives will be discussed. It is not what SACS AAPT and SACS would do for you; it is what you would do for Science Education via SACS AAPT and

SACS. These principals could be easily applied to expanding SACS collaboration with SC Association of Chemistry Teachers, SC Earth Science Teachers Association, SC Association of Biology Teachers, SC Science Supervisors Association, SC Marine Educators Association, Environmental Educators Association of SC and others

INVOLVEMENT OF HSP70 CHAPERONE IN AUTOPHAGIC CELL DEATH OF INSECT FLIGHT MUSCLES

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We have investigated the possible involvement of the 70 kDa heat shock protein (HSP70) in the process of flight muscle histolysis. Flight muscle histolysis is a developmentally regulated event, which occurs within the first few days of adult emergence in the house cricket, *Acheta domesticus*. Histolysis results in degeneration of the flight musculature and accounts for loss of flight in winged adult crickets. An initial significant loss of total protein from dorsal longitudinal flight muscles (DLMs) is evident on the second day (Day 2) of adult emergence. By Day 3 more than one half the mass is lost from the muscles and there is little sign of myofibrillar organization. The rapid phase of degeneration appears to be due to the induction of autophagic programmed cell death and lysosomal activity. The presence of HSP70 in ammonium sulfate precipitated homogenates from Day 3 DLMs was revealed by liquid chromatography tandem mass spectroscopy (LC/MSMS). We have designed primers for polymerase chain reaction to study the gene and transcript for HSP70 in the house cricket. Preliminary results suggest HSP70 may act in chaperone mediated autophagy during histolysis of the flight muscles of the house cricket. This research was supported by SC-INBRE-NSF/EPSCOR , NIH-RIMI (MD 00233) and MBRS-RISE.

EVALUATING THE TOXICITY OF CYFLUTHRIN TO THE EARTHWORM, *EISENIA FETIDA*, USING 96-HOUR FILTER PAPER CONTACT TESTS

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The insecticide Cyfluthrin, known commercially Baythroid, is commonly used for pest management in the poultry industry. Cyfluthrin is a synthetic pyrethroid insecticide used to control parasites and flies. Cyfluthrin is applied as a spray inside of chicken houses, and it has the potential to build up in the litter. Chicken litter and feathers are commonly stored outdoors after being removed from the chicken houses. This poultry waste is hauled away only a few times a year. Therefore, this chemical has the potential to adversely affect terrestrial non-target organisms. The objective of this study was investigate potential risks of this pesticide to the terrestrial soil-dwelling organism, *Eisenia fetida*, using 96-hour filter paper contact tests. Preliminary results indicate total mortality after 96 hours at concentrations greater than 66 $\mu\text{g}/\text{cm}^2$. Sublethal effects noted at lower concentrations include lesions and bodily deformities after 96 hours.

FLAP ENDONUCLEASE FROM *ARCHAEGLOBUS FULGIDUS*

Stedmen Bolger, Sherell Morrison and Jianguo Chen

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Archaeoglobus fulgidus is the first sulfur metabolizing organisms to have its genome sequenced. *Archaeoglobus fulgidus* are hyperthermophilic marine sulfate reducers commonly found in hydrothermal environments such as oil deposits and hot springs. The optimum growth for *A. fulgidus* is at 83°C with a minimum division time of 4 hours. Its genome consists of 2,178,400 base pairs, 2,436 coding sequences and includes the Flap endonuclease (FEN) gene which belongs to a class of nucleolytic enzymes that acts as both a 5'-3' exonuclease and structure specific endonuclease. As a genome stabilization factor, FEN prevents overhangs also referred to as "flaps", from equilibrating into structures that lead to duplications and deletions during the biological process of DNA repair, replication and recombination. The purpose of this project is to clone and express the FEN gene from *A. fulgidus* so that it may be used to create a fusion protein for SNP detection

Polymerase chain reaction (PCR) was used to amplify the FEN gene from the *A. fulgidus* genome. Restriction sites, BamHI and NdeI were introduced to the ends of the FEN sequence by two oligonucleotide-primers. The PCR product was ran on 1% ethidium bromide agarose gel and visualized under UV light showing the *A. fulgidus* FEN gene at approximately 1 kb. The Quiagen Gel Extraction kit was used to purify FEN DNA from the agarose gel and quantify the amount of DNA amplified. 1 μ g of pET-15b plasmid and FEN DNA were cut overnight with BamHI and NdeI at 37°C in a final volume of 20 μ l. T4 DNA ligase catalyzed the joining of pET-15b and the FEN gene. Future studies will include a bacterial transformation of the ligation reaction followed by a restriction digest to screen for the presents of any plasmid clones.

DIMORPHIC SEEDS SHOW DIFFERENTIAL VIABILITY WITH AGE

Shari Bookert and Andrew R. Dyer

Dept. of Biology & Geology, USC Aiken

In *Aegilops triuncialis*, an annual grass, dimorphic seeds are produced as an apparent bet-hedging strategy; the larger seed germinates rapidly with wetting while germination of the smaller seed in a pair is naturally suppressed chemically. The bet-hedging strategy predicts greater population stability when there is a balance between seeds that emerge rapidly and are competitive for resources and those that remain dormant as insurance against catastrophic loss of the rapidly-emerging cohort. If this strategy is accurate, dormant small seeds should maintain viability longer than the non-dormant larger seeds. We tested many populations four to six years in age and found a rapid loss of viability after four years regardless of seed size, but with consistently higher viability in the smaller seeds of seed pairs. Although populations differed in germination fraction, the pattern of viability loss was consistent among populations. These results strongly support the notion that seeds in seed banks have physiological processes that differ from seeds that germinate rapidly. This is very likely of adaptive value in colonizing and invasive species such as *A. triuncialis*.

THE RADIUS AND RATE OF PERIOD CHANGE OF THE S-CEPHEID, EU TAURI
Kirk A. Boyer, Christina Lewandowski and Robert J. Dukes Jr.
Dept. of Physics and Astronomy, College of Charleston

The short period Cepheid EU Tauri (= HD38321 = HIP27183; $V = 7.94$) was on the observing program of the Four College Consortium APT for several years. We were observing it based on the suggestion that it was a multimode Cepheid. We obtained approximately 194 UBVR observations on 112 nights from JD 2448276 through JD 2448988. When EU Tauri was shown to be pulsating in only one mode, both by our observations and those of others, this star was dropped from our observing program. Recently however it has been brought to our attention that short period, s-type Cepheids show period changes over relatively short time scales. We therefore returned EU Tauri to the APT observing program and have obtained approximately 100 new observations on 69 nights from JD2454390 through JD2454427 . We then combined our data with published data extending over 35 years and determined an average period from the entire data set of 2.10248 days. We then used this period to determine the Fourier coefficients for each data subsets in order to find any phase shifts between sets which would be indicative of a changing period. These phase shifts were indicative of a period change of 0.0416 s/yr. This indicates that EU Tauri is on its third crossing of the Cepheid Instability Strip. We also used both our data and a contemporaneous radial velocity set in an attempt to determine the radius of 25.1 solar radii. This work has been supported by NSF Grants 86-116362, AST-91-15114, and AST-050755 to the College of Charleston.

THE *B. CEREBUS* CONTAINING SUB-BRANCH MOST CLOSELY RELATED TO *B. ANTHRACIS*, HAVE SINGLE AMINO ACID SUBSTITUTIONS IN SMALL ACID SOLUBLE PROTEINS, BUT REMAINING SUB-BRANCHES ARE MORE VARIABLE.

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Hoffmaster et al. (2004, 2006) phylogenetically divided *B. cereus* strains into 10 branches by amplified fragment length polymorphism (AFLP) with Branch F including all *B. anthracis* strains and pneumonia-causing strains of *B. cereus*. On further examination, there are four sub-branches within Branch F, referred to here as F1-A, F1-B, F2-A and F2-B. The *B. anthracis* strains are found within sub-branch F1-B. Concerning, the currently available *B. cereus* pneumonia-causing isolates, one was found to categorize within sub-branch F1-B and two within F2-B. In the following work the sequence variation between *B. cereus* strains was determined by MALDI TOF MS and MS-MS for each strain of *B. cereus* in Branch F. ESI MS was performed on selected strains for confirmation. SASPs of *B. cereus* strains found in F1-B showed a single amino acid substitution, while strains in the other three sub-branches were more variable generally showing one or two amino acid substitutions. The single substitutions always occurred in the C-terminus. Double substitutions occurred in both N and C termini. Of the pneumonia causing strains, one exhibited a single amino acid substitution, while the other two exhibited a two amino acid substitution. *Supported by funds from the Sloan Foundation and "USC Research Council and small grants program" to A. Fox. Courtney Callahan was supported by a fellowship from the NIH PREP Program.

CD SUBSTITUTION EFFECT IN $\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_{2-x}\text{Cd}_x\text{O}_y$

Allen J. Carlton and Jafar Amirzadeh

Division of Natural Sciences, Morris College

The effect of substitution of Cd for Ca in bismuth superconductor will be reported. Solid-state method was used to synthesize $\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_{2-x}\text{Cd}_x\text{O}_{y \leq 2}$ with $x = 0.05, 0.1, 0.2, 0.5, 1, 1.5, 2$ and tested for superconductivity. A four-probe method was used for measuring resistivity of the samples to determine transition temperature. The synthesis effect on electrical conductivity and superconductivity transition temperature was investigated by electron microscopy (SEM) and GDAX.

QUANTITATIVE EXPRESSION ANALYSIS OF CANDIDATE REGULATORY GENES INVOLVED IN ASEQUAL FUNGAL DEVELOPMENT.

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In a previous study, we identified genes expressed during asexual development (conidiation) by the filamentous fungus, *Exserohilum turcicum*. Of these, twelve genes exhibited high translated similarity to proteins involved in signaling cascades or gene regulation, including three classes of monomeric G-proteins, various kinases and receptors, and a transcription factor. Results of efforts to functionally characterize their respective homologs found in other economically important fungi, such as *Fusarium graminearum*, will lead to a broader understanding of factors influencing survival and dispersal of plant pathogenic fungi. In this study, we developed a culturing method to analyze and compare the expression levels of all twelve candidate genes in conditions that either support or repress conidiation in *F. graminearum*. Specifically, total RNA was isolated from fungal cultures that were initially grown for 4 days in nutrient-rich medium (YEG, Yeast Extract Glucose), mycelia collected, washed, and transferred onto either medium non-conducive for asexual development (YEG) or medium conducive for asexual development (CMC, Carboxymethylcellulose). The resuspended mycelia were incubated in shake culture for an additional 2 days. At this time, conidia production was observed by wild type only in the CMC liquid cultures, while asexual development was not supported in YEG-grown cultures. Total RNA was isolated from tissue samples and used to produce cDNAs for use as templates for qPCR analysis. Oligonucleotide primers were designed specifically to detect the expression levels of each of the twelve candidate regulatory genes under study. The expression levels for all genes will be normalized to the beta-tubulin gene of *F. graminearum*, known to be expressed at consistent levels at all stages of growth and development by the fungus.

EFFECT OF OVEREXPRESSION OF TISSUE TRANSGLUTAMINASE (TG) ON CELLULAR GROWTH AND INDUCTION OF APOPTOSIS IN HUMAN BREAST CANCER CELLS.

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Tissue transglutaminase (TGC), a unique member of the transglutaminase family, catalyses transamidating reactions and also binds and hydrolyses GTP and ATP. We have investigated the expression of TGC enzyme by transient transfection of human breast cancer (MCF-7 and T47D) cell lines which normally express low amounts of transglutaminase. Cells were transfected with eukaryotic expression vectors pcDNA, containing inserts of the 55 kDa active isoform (L) or the 80 kDa full-length zymogen

(TGC). The highest rates of apoptosis were found in cells transfected with the L isoform as compared to TGC and the PcDNA controls. Effects of over-expression of L were assessed by using Trypan blue staining for cell growth and viability and by using flowcytometry (Annexin-FITV) for quantification of apoptosis. Transient expression (1-3 days) of L and TGC were demonstrated using immunocytochemistry to show the two transglutaminase isoforms at 55 kDa and 80 kDa. The calcium ionophore (A231827) was used to induce transamidation reactions and found to induce further apoptosis. Cystamine, an active TG inhibitor, blocked the apoptotic effect of over-expression of the active L-isoform. These results indicate that the TG-dependent irreversible cross-linking of intracellular protein represents an important biochemical event in the induction of the structural changes featured in cells dying by apoptosis. The research was supported by NIH-RIMI, NSF-HBCU-UP, and NNSA (DOE).

CAT'S CLAW AS A POTENTIAL HERB PRODUCT FOR MEDICINAL USE

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Cat's claw, or *Uncaria tomentosa*, is a medicinal plant from Peru. It has been claimed to have anti-microbial, antioxidant, anti-viral, anti-inflammatory, and anti-tumor properties. Due to these properties, cat's claw has been used to treat such conditions as cancer, AIDS, immune disorders, gastritis, ulcers, arthritis, rheumatism, and herpes. Cat's claw contains over 50 biologically active compounds that may be beneficial to humans for medicinal uses. It contains rhynchophylline which inhibits platelet aggregation and thrombosis (Steinberg, 1994). Cat's claw also contains other compounds such as uncarines, rotundifoline, and quinovic acid glycosides. Due to its use as a medicinal plant, research was conducted to determine the biological activity of cat's claw. Antioxidant activity, cytotoxicity, tumor suppressing activity, and estrogenic activity was measured using previously published methods. Cat's claw was observed to have 130.5 mg gallic acid equivalents/gram of tissue and 204.1 mM trolox equivalents/gram. Two *Agrobacterium tumefaciens* potato tumor induction assays showed crude extracts of cat's claw to have only slight anti-tumor activity. The brine shrimp assay showed a strong correlation between the number alive and the dilution of the sample. The LD50 was 1:2626, indicating that cat's claw was only slightly toxic. Using a human recombinant estrogen receptor beta binding assay, the estrogenic potential of the extract was 387 ng estrogen binding equivalents per gram. From this assay cat's claw would not be considered very "estrogenic" with a binding activity about 10 times less than red clover and 30 times less than alfalfa. In summary, cat's claw extract has strong antioxidant properties, only slight anti-tumor activity and slight toxicity. Further testing may be conducted to determine other biological activities of this product.

SYNTHESIS OF AN [2'-(1-ETHYL-4,5-DIMETHYL-1H-IMIDAZOL-2-YL)BIPHENYL-3-YL]OXY}ACETIC ACID; AN INHIBITOR OF AP2 AND A NEW APPROACH FOR DIABETES TREATMENT

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Adipocyte fatty acid binding protein (aFABP, aP2) is a 14.6 kDa cytosolic protein located in adipocytes and macrophages and assists in the intracellular transport of fatty acids.^{1a,b,c,d} It is one of a class of fatty acid binding proteins (FABPs) that are found predominately in

the liver, heart, intestine and connective tissues. Hotamisligal *et al.* have reported that aFABP deficient mice, when placed on a high fat diet (40% of caloric intake as fat), were significantly protected from hyperinsulinemia and insulin resistance compared to the wild type.² Additional genetic experiments have been reported in which aFABP null mice have been crossed with *ob/ob* and in another instance apoE^{-/-} mice. The aFABP deficient *ob/ob* mice were more insulin sensitive when compared to *ob/ob* controls as demonstrated measuring by circulating glucose and insulin levels.³ Based on these genetic knock-out models, we pursued the development of inhibitors of aFABP for their therapeutic potential in the treatment of diabetes. Herein we disclose the synthesis of {[2'-(1-ethyl-4,5-dimethyl-1*H*-imidazol-2-yl)biphenyl-3-yl]oxy}acetic an inhibitor of ap2.⁴

PREPARATION OF N-PHENYLPYRAZOLE-BENZOIC ACIDS FROM DILITHIATED PHENYLHYDRAZONES AND METHYL HYDROGEN PHTHALATE

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N-Phenylpyrazolebenzoic acids were prepared by the condensation-cyclization of dilithiated C(α),N-phenylhydrazones with lithiated methyl hydrogen phthalate (MHP). The C-acylated intermediates that resulted were not isolated but immediately cyclodehydrated with dilute hydrochloric acid to afford variously substituted N-phenylpyrazolebenzoic acids. The selection of MHP is compared to phthalic anhydride. While both electrophilic reagents condensed with the phenylhydrazone dianion to give the same C-acylated intermediate, MHP affords readily reproducible and consistent reactions and products. The success with MHP has resulted in a general synthesis for these materials with biological and other potential. The condensation-cyclization of MHP with other 1,4-dianion systems, such as dilithiated oximes, is not as straightforward, and they are under study. The condensation-cyclization of dilithiated oximes with phthalic anhydride and related anhydrides gave the targeted isoxazole benzoic acids, but the percentage yields for a given system were not reproducible.

INTERLEUKIN 1-BETA EXPRESSION IN SOLID MALIGNANCIES

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The cytokine IL-1 promotes a variety of actions including inflammatory, hematopoietic, immunologic, angiogenic and proliferative activities. IL-1 exists in two isoforms, IL-1 alpha (IL-1A) and IL-1 beta (IL-1B). IL-1B mRNA and protein were recently shown to be present in greater than 50% metastases from patients with melanoma, lung and colon cancer. IL-1B is known to influence tumor growth and metastasis by increasing cellular proliferation and angiogenesis. Both IL-1A and IL-1B have been shown to contribute to tumor angiogenesis and invasiveness, but the role of IL-1B is more critical in these processes. Effects of IL-1A are limited, as the cytokine is mostly cell-associated. IL-1B is secreted into the microenvironment, thus having a greater potential for widespread activity. Previous work done in this laboratory has demonstrated that IL-1 mRNA is expressed in human prostate and colon cancer cell lines and that IL-1A and IL-1B increase the secretion of the tumor markers chromogranin A in prostate cancer and carcinoembryonic antigen (CEA) in colon cancer. While IL-1A and IL-1B mRNA and protein levels have been previously examined in extracts of human cancer tissue and in human cancer cell lines, IL-1B levels have not been well-studied in intact human cancer specimens. In this study we have examined, by immunohistochemistry, the frequency of IL-1B expression in primary cancer specimens from several solid malignancies. Moderate

to high levels of IL-1B were found in 26 (58%) of 45 breast cancer, 36 (63%) of 57 prostate cancer, 5 (11%) of 46 lymphoma, 7 (32%) of 22 CNS tumor, 7 (35%) of 20 melanoma, 33 (61%) of 54 colon cancer, 22 (43%) of 52 lung cancer and 22 (55%) of 36 ovarian cancer specimens. Our results indicate frequent IL-1B expression in several solid malignancies. Supported by SC INBRE grant number RR16461.

CONTRIBUTIONS OF TOTAL PETROLEUM HYDROCARBONS TO NON-POINT SOURCE RUNOFF FROM THE USC AIKEN CAMPUS

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Non-point source water pollution comes from many different sources and is caused when rain or snow melt contacts and moves over the ground. This runoff carries natural and anthropogenic contaminants which are ultimately deposited into streams, rivers, estuaries, and oceans. This research focused primarily on total petroleum hydrocarbons as the non-point source water pollutant. This particular pollutant arises from the oil and gasoline residues which are found on virtually every parking. The area under investigation consists of three parking lots located at the USC Aiken (USCA) campus. The runoff from these parking lots is deposited directly into a surrounding wooded area without any form of treatment or retention. The objectives of this study were to quantify petroleum hydrocarbons entering the environment during rainfall events and investigate additional threats posed by this runoff, including toxicity and erosion. Results indicated petroleum hydrocarbon concentrations ranging from 11 ppm during first flush to a steady concentration of approximately 4 ppm after 60 minutes of rainfall. These data were used to calculate a total contribution of 710 grams of gasoline to the surrounding environment during one rainfall event. Toxicity results were negligible, and erosion was significant in places around the campus.

THE EFFECTS DROUGHT, INCREASED SALINITY, AND HURRICANE DISTURBANCE ON TIDAL FRESHWATER FOREST PRODUCTIVITY AND GREENHOUSE GAS PRODUCTION

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Field efforts to quantify forest structural differences, shifts in carbon balance, and soil physico-chemical properties in forested wetlands are the principal elements of our USGS Global Climate Change Project. Sea-level rise has exposed freshwater swamp vegetation to salt-water intrusion and submergence for decades. However, there is mounting evidence that exacerbations in intensity of exposure have occurred over the past 50 years, causing rapid state changes to these communities. The state change can be continuous, starting with bald cypress-tupelo associations, transitioning to bald cypress intermixed with marsh plants, and ending with one of three states: degraded bald cypress, marsh with dead-standing bald cypress, or open water. For this study, we have selected 9 sites along three coastal landscape transects in South Carolina and 6 sites along two coastal landscape transects in Louisiana. Field sites in eastern Louisiana show the impact of Hurricane Rita (2005) which inflicted a storm surge and salt pulse spanning hundreds of miles to the east of landfall. Field studies in South Carolina and Louisiana demonstrate that forest complexity and productivity are negatively correlated with residual interstitial soil salinities. Projected sea-level rise and changing climate is expected to accelerate the processes and extent of saltwater intrusion.

GENETIC ANALYSIS OF PHELAN MCDERMID SYNDROME

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Phelan McDerimid Syndrome is a genetic condition caused by a deletion of the terminal region of the long arm of chromosome 22 (22q13). The types of chromosome abnormalities which cause deletions in this region include terminal deletions, unbalanced translocations, and rings. This syndrome manifests itself physically with abnormal facial features, abnormalities of the hands and feet, skeletal and muscular defects, heart defects, and seizures. These individuals can also exhibit behavioral problems and developmental delays. We are interested in the type of chromosome aberration in each patient, whether or not there is a correlation between the size of the deletion and the severity of the phenotype, the parent of origin of the affected chromosome, if the deletion is inherited or not, and the size of the deletion. The reported size of the chromosome deletion is between 1 Megabase and 20 Megabases. We have collected 117 samples from patients with a clinical diagnosis of Phelan McDerimid Syndrome for testing. Chromosome analysis has yielded 89 terminal deletions, 9 rings, 2 interstitial deletions, 6 mosaic deletions, 10 translocations, and 3 that presented as normal. Of these, we have determined the size of the deletion using Multiplex Ligation-dependent Probe Amplification (MLPA) in 62 of the patients. Karyotype analysis is currently being performed on the parents of the affected individuals to determine if the aberration is inherited. Preliminary testing shows normal results on 56 of the parents in this study.

SYNTHESIS AND CHARACTERIZATION OF NEW AMINO-BIS-PHOSPHONATES

Jonetha Fleming and Pete Peterson

Francis Marion University

Phosphonates are increasingly being used as ligands for the fabrication of new inorganic-organic hybrid materials having potentially useful properties. To this end, we have prepared a series of new amino-bis-phosphonates by a Mannich type reaction starting from primary or secondary amines, phosphorous acid, and formaldehyde in an acidic environment. Full details on the synthesis and some initial characterization of these compounds will be presented.

EXPRESSION OF AN ANTI-HIV TAT RIBOZYME IN A TISSUE CULTURE MODEL

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The Acquired Immune Deficiency Syndrome is a collection of symptoms and infections caused by specific damage to the immune system from the Human Immunodeficiency Virus (HIV-1). HIV-1 infects and kills TH lymphocytes, which leads to the development of opportunistic, life threatening infections. The HIV-1 genome expresses six accessory genes: rev, vif, nef, vpr, vpu and tat, along with three structural proteins: gag, pol, and env. Tat is a small regulatory protein that up regulates transcription from the viral promoter by increasing RNA polymerase II processivity. Because tat plays an integral role in viral replication, it is a good target for anti-viral reagents such as ribozymes. Hammerhead ribozymes are small catalytic RNAs that cleave specific mRNA substrates

in a complementary manner. Previously, our lab designed and cloned a library of hammerhead ribozymes targeted to tat RNA. These ribozymes Tat5840, Tat5910, and Tat5940 were tested for their ability to cleave tat RNA in an in vitro assay. The results of these tests suggested that Tat5910 was the most effective at cleaving the tat RNA substrate. To test the anti-tat activity of this ribozyme, it was cloned into the retroviral vector pSuper.retro.GFP+neo. pSuper.retro.GFP+neo was designed to produce the retrovirus pSR5910 transcribe small interfering RNAs (siRNA) from an RNA polymerase III promoter and should efficiently express ribozyme RNA. To determine the ability of to generate retroviral particles, 293T cells were transiently pSR5910 transfected by calcium phosphate using a three plasmid system; pVPackgagpol, . After 48 hours virus was harvested and used to pVPackVSV-G, and pSR5910 transduce NIH3T3 cells. GFP expression was observed in these cells, indicating successful delivery of the ribozyme containing vector. Integration of the provirus will be determined in stably transduced NIH3T3 cells. DNA and RNA will be isolated from these cells and analyzed for both the presence of the integrated provirus and ribozyme expression. The DNA will be analyzed for proviral integration by PCR using primers to each LTR and an internal vector sequence. Ribozyme expression will be analyzed by RT-PCR using total cellular RNA and ribozyme specific primers. PCR products of expected size will be visualized by agarose gel electrophoresis. The retroviral vector LNCE, which does not express Tat5910 ribozyme, will be used as the control.

PREPARATION OF NH-PYRAZOLES FROM POLYLITHIATED HYDRAZONES OR DILITHIATED BETA-KETOESTERS AND A VARIETY OF AROMATIC ESTERS

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NH-Pyrazoles were prepared. by condensation-cyclization of dilithiated select C(alpha),N-carbo-tert-butoxyhydrazones with aromatic esters including methyl 2-(aminosulfonyl)benzoate to afford C-acylated intermediates, not isolated, but neutralized and treated with excess 6 M hydrochloric acid. After the anticipated cyclization, hydrolysis and decarboxylation, this resulted in the isolation and characterization of targeted NH-pyrazoles in modest yields. The products have biological potential in medicine and agriculture. While the preparation of NH-pyrazoles involving general condensation of dianion-type intermediates with most substituted benzoate esters was straightforward with regard to characterization of products, the characterization of NH-pyrazole-ortho-benzenesulfonamides resulting from the condensation-cyclization of dianion type intermediates with methyl 2-(aminosulfonyl)benzoate required special attention. Products from this second reaction sequence have the potential of being isomeric spiro(benzisothiazole - pyrazole)dioxides. Select beta-ketoesters were dilithiated with excess lithium diisopropylamide, condensed with a variety of aromatic esters to afford new beta-diketocarboxylates, which were isolated and characterized. These compounds were condensed-cyclized with hydrazine to NH-pyrazoles.

EFFECT OF PATHOGEN ON MIRNA TARGETS AND CLONING OF MIR-GENES FOR OVEREXPRESSION

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Small RNAs (sRNAs) play important regulatory roles in plant immunity. Small RNAs range in size between 20 and 26 nts and contribute to the silencing of these invading nucleic acids, such as viruses or transgenes. Pathogens released proteins can interfere with various steps in gene silencing pathways. Over expression of specific miRNA genes have resulted in significant modulations in development, biotic and abiotic stress responses in Arabidopsis. Here, we study the effect of pathogen on regulating miRNA target genes in Arabidopsis. *Pseudomonas syringae* was inoculated onto Arabidopsis and miR160 and miR171 target levels ARF17 and SCL6 levels, respectively were tested. We found that both target levels were reduced upon pathogen infection. The other work was to clone and overexpress MIR395 and MIR863 genes in Arabidopsis to study their role in disease resistance.

TOO MUCH OF A GOOD THING: SPERM INSEMINATION DOSE AND INTRAUTERINE INSEMINATION PREGNANCY RATES

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Intrauterine insemination (IUI) is one of the first-line treatments that physicians attempt in couples experiencing fertility problems. Intrauterine insemination is a relatively simple process that incorporates concentrating sperm by removing the seminal fluid from the ejaculate, placing sperm in an insemination catheter, passing the catheter through the cervix into the uterus, and releasing the sperm into the uterus. The current practice of IUI is to inject the entire prepared sperm sample into the uterus, regardless of the concentration. However, this retrospective analysis of IUI data was initiated to determine if too high a concentration of sperm may “spoil” the environment of the uterus and thereby reduce pregnancy rates. Data were collected between mid -2005 to mid -2007 representing all patients undergoing IUI cycles at the Reproductive Endocrinology and Infertility Division in Greenville, South Carolina. Information on 527 cycles was available for the analysis. Total motile sperm concentrations of the IUI's were divided into quartiles for comparisons. These quartiles/inseminations doses were 1) < 6.7 million/mL; 2) 6.7 – 16.6 million/mL; 3) 16.7 – 32.5 million/mL; and 4) > 32.5 million/mL. To isolate the effects of sperm concentration, other known factors were examined which impact pregnancy rates. Factors such as age, body mass index, gravida, stimulation regime, attending physician and sperm motility were considered separately. Then the combined effect of multiple factors on pregnancy rate was assessed using logistic regression. The pregnancy rate was lower for IUI when sperm concentration was low (first quartile). The logistic regression models confirm this result after adjusting for the age of the patient. These findings do not support the hypothesis that “too much of a good thing” may be harmful and decrease the pregnancy rate. However, these data suggest that a threshold number of sperm may exist to optimize IUI success.

QUALITATIVE AND QUANTITATIVE ANALYSES OF GINGER AND LICORICE TO STUDY POTENTIAL ANTI-CANCER PROPERTIES

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Licorice and ginger are herbal products believed to have possible cancer-fighting activity. Several assays were done to evaluate the biological properties of these compounds to further test their anti-cancer abilities. Using the *Agrobacterium tumefaciens* potato tumor induction assay, licorice significantly inhibited tumor growth at concentrations of 1:10, 1:100, and 1:1000 when compared to a control with no extract. Tumor growth was also inhibited at concentrations of 1:10000 and 1:100000, but the inhibition was not significant. The LD50 for licorice was 1:826 as determined by separate brine shrimp toxicity assays. A human recombinant estrogen receptor beta assay was used to determine the estrogenic potential of licorice and ginger. Estrogen beta binding equivalents (EBE) for these compounds revealed them to be moderately estrogenic with values of 2,082 ng/g for licorice and 1,902 ng/g for ginger. These values are similar in range as the EBE for red clover, an herb widely used for its estrogen activity in the treatment of menopause. The trolox antioxidant assay was used to show the ability of the product to bind up free radicals. The licorice contained on average 705 trolox equivalents per gram. Phenolic activity was determined to be 27,988 mg gallic acid equivalents per gram of tissue. In summary, licorice has potential for anti-tumor activity, a low level of toxicity, high antioxidant and phenolic activity, and significant estrogen binding activity. Ginger has only recently been examined for its estrogenic activity and follow-up studies should be done to further test its EBE.

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

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HIV-1 is a lentivirus that infects CD4+ T cells, resulting in a gradual deterioration of immune function and the onset of the Acquired Immune Deficiency Syndrome (AIDS). The HIV-1 genome expresses three structural genes: gag, pol, and env, and six accessory genes: tat, rev, vif, vpr, vpu, and nef, which control viral replication and infectivity. Research has shown that reagents targeting these accessory genes directly impact viral function. Hammerhead ribozymes are small, catalytic RNAs that can be designed to target and cleave substrate RNAs at specific sequences. Ribozymes, when targeted to HIV-1 mRNAs such as tat and rev, have been shown to greatly reduce or inhibit viral replication. The HIV-1 virion infectivity factor (vif) gene encodes a protein that counteracts an innate, antiretroviral defense mechanism of non-permissive CD4+ T cells. This mechanism is mediated by apolipoprotein B mRNA-editing enzyme-catalytic polypeptide-like 3G (APOBEC3G), a cytidine deaminase that is encapsulated into assembling virions in the absence of vif and is inhibitory during the next round of viral replication. Vif neutralizes APOBEC3G by reducing its translation and by rapid degradation of the native protein. Vif mRNA, therefore, is a good target for ribozyme mediated inhibition of HIV-1 infection. A hammerhead ribozyme targeted to vif at nucleotide 5127 of the HIV-1 genomic clone NL43 was designed to test this hypothesis. A ribozyme template was

converted to dsDNA by PCR and ligated into pPCR-Script Amp SK(+). The ligation reaction was used to transform XL10-Gold competent cells, which were plated on LB/Amp containing X-gal and IPTG. Six of the resulting colonies were picked and expanded. Miniprep DNA was prepared from each culture and analyzed for ribozyme presence by PCR. One clone was determined to contain the Vif5127 ribozyme, which was verified by sequencing. Vif5127 is a member of a library of three ribozymes, and their non-catalytic controls, targeted to various sites within the vif open reading frame. The catalytic activity of these ribozymes will be tested in in vitro cleavage assays using vif RNA as a substrate. For this each ribozyme, as well as the vif gene, was amplified from its plasmid with primers containing the T7 promoter sequence. In addition, each ribozyme is being subcloned into the retroviral vector, pSUPER.retro.GFP+neo for studies of anti-vif activity in a cellular model.

NEW METAL-ORGANIC COMPOUNDS UTILIZING 2, 2'-BIPYRIMIDINE

Sarah Hickman and Pete Peterson

Francis Marion University

2, 2'-Bipyrimidine (bpm) has proven to be a useful and popular ligand for the construction of metal-organic coordination polymers. Our work in this area has yielded three new bpm-containing metal-organic compounds whose crystal structures were determined by X-ray diffraction. These structures show that bpm can bind to metal ions in either the chelating or bis-chelating coordination mode. The synthesis, crystal structures, and characterization of these compounds will be discussed.

A FERMENTATION/GC ANALYSIS LAB DESIGNED FOR THE LIBERAL ARTS CHEMISTRY CURRICULUM

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Fermentation occurred first in nature, and throughout the centuries mankind has used various methods to harness this chemical process. Since the demand for green energy has increased, ethanol has slowly come into the foreground as an alternative fuel source. Gas chromatography (GC) is the standard method for separation and analysis of volatile organic compounds. Combining the techniques of fermentation and GC analysis in a laboratory setting stimulates the interest of Liberal Arts students on a college campus while also teaching them about modern chemical principles and techniques. For the fermentation reaction a variety of glucose sources were used: commercial grape juice, commercial apple juice, a sucrose solution, the juice from crushed commercial white seedless grapes, and the juice from locally-grown muscadine grapes. Mixtures of juice and yeast (density values ranging from 1.05 g/mL-1.08 g/mL) were left to ferment for several weeks (temperature range 22° C-24° C). The amount of ethanol produced varied from 2.48% to 13.25%, with the sucrose solution producing the least amount of ethanol and juice from the crushed white grapes producing the highest amount. Through this lab students become familiar with the biochemical process of fermentation while also gaining a basic understanding of an important analytical chemistry technique.

ADIPONECTIN MEMBRANE RECEPTORS: ADIPOR1 AND ADIPOR2

Alena James and Chasta Parker

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Metabolic syndrome is a set of risk factors that cause individuals to develop obesity, Type II Diabetes, and cardiovascular diseases. Metabolic syndrome correlates with decreased serum levels of the protein hormone adiponectin. In transgenic mice, reduced levels of adiponectin signify glucose intolerance, insulin resistance and increased adiposity. Two recently identified receptors for adiponectin are AdipoR1 and AdipoR2. The receptors are 66% homologous and belong to the PAQR protein family. The purpose of this study was to produce recombinant Human AdipoR1 and AdipoR2 in *Spodopetra frugiperda* (Sf9) cells in order to produce large quantities of the protein for structural characterization. To optimally express the receptors, experiments were performed to: 1) Determine the integrity of AdipoR1 and AdipoR2 plasmids. 2) Determine optimal transfection conditions and 3) Determine the most efficient protein extraction method. The integrity of the plasmids was verified by restriction digest analysis and DNA sequencing. Optimal transfection conditions showed that the most effective level of Insect GeneJuice (Novagen) to use was 5 μ l GeneJuice/ μ g DNA in 6 well plates. Two protein extraction techniques were used to isolate AdipoR1 and AdipoR2 from the hydrophilic proteins in the cell, the Pierce Mem-Per® Eukaryotic Membrane Protein Extraction Reagent Kit appears to be the best for these particular proteins. The project was supported by the Winthrop University Research Council and NIH Grant Number P20 RR-16461 from the NCRR for support of the program entitled "South Carolina IDeA Networks of Biomedical Research Excellence (SC-INBRE)".

MYOFIBRIL ASSEMBLY AND ELASTICITY IN *DROSOPHILA* FLIGHT MUSCLES

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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.

PROTEOMIC STUDIES OF BACTERIAL DIVERSITY IN INDOOR AIR

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Our goal is to develop approaches, with or without prior culture, using protein sequences for identification of bacterial species present in buildings. Previously we demonstrated that large particles and bacterial markers increase greatly on school occupation; it was hypothesized that their source was shed human skin. In recent work, testing this hypothesis, room air cleaners were used to collect airborne dust from school rooms.

Proteins were extracted from the dust and separated using gel electrophoresis. Trypsin digestion of protein spots, released peptides which were analyzed by tandem mass spectrometry. The most abundant protein was identified as K10 epithelial keratin. The results experimentally confirm previous anecdotal reports that human skin is shed into air (agreeing with the hypothesis). In ongoing work, the feasibility of using protein sequences for identifying bacterial isolates of environmental and human origin and 2) identifying bacterial species present in dust (without culture) is being explored. *Supported by Sloan Foundation Indoor Air Program and USC Research Council Small Grants Program. SJ received fellowship/travel funds from NIH PREP program.

THE EFFECT OF LASER ASSISTED HATCHING (LAH) ON SUBSEQUENT MOUSE EMBRYO DEVELOPMENT

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Mammalian embryos are encased in a proteinaceous shell called a zona pellucida (ZP). Normally, this shell thins by internal stretching and eventually breaks allowing the embryo to escape and attach to the endometrial lining of the uterus where it will implant. Embryo hatching and implantation may be compromised in patients when the ZP of their embryos is considered to be too thick. Laser assisted hatching (LAH), which creates an artificial opening in the ZP, may facilitate embryo hatching and subsequent implantation. Laser systems available for AH allow the operator a choice of various laser intensities. As the use of the laser creates heat that can be detrimental to embryos, the goal of LAH is to use the lowest laser intensity that will breach the ZP successfully. The purpose of this study was to determine how LAH using two different laser intensities (Medium and High) affected subsequent development of mouse embryos. Mouse embryos were collected from B6C3F1 donor females at the two-cell stage and cultured 24 hours to the eight-cell stage. A total of 202 embryos were included in this study. Thirty-seven control embryos were not subjected to LAH. Seventy-five embryos were hatched using one Medium intensity laser pulse. Ninety embryos were hatched using one High intensity laser pulse. All embryos were cultured an additional 48 hours and rates of continuing embryo development were compared for the three groups. The data demonstrated no statistically significant differences ($P = .3$) in embryo development between the control embryos (no LAH; 35/37; 95% expanded blastocysts) and the LAH embryos (Medium LAH: 74/75; 99% expanded blastocysts and High LAH: 89/90; 99% expanded blastocysts). Using the laser to facilitate embryo hatching did not appear to be detrimental to subsequent embryo development. In addition, one Medium intensity laser pulse was as effective as one High intensity pulse at breaching the ZP of the mouse embryos. A Medium laser pulse also creates less heat around the embryo making LAH safer for all embryos subjected to this procedure.

ECOLOGY OF DIAMONDBACK TERRAPINS IN NORTH INLET, WINYAH BAY, SC.

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¹North Inlet -Winyah Bay National Estuarine Research Reserve

Diamondback terrapins (*Malaclemys terrapin*) have been studied for 2 summers at the North Inlet, Winyah Bay National Estuarine Research Reserve. Eighty six terrapins have been individually marked and released in tidal creeks in the estuary. Terrapins have been caught in 9 of the 14 creeks surveyed. Four terrapins were recaptured in 2007, 3 in the same tidal creek where they originally caught in 2006 and 1 from an adjacent creek. A preliminary study of feces content indicate the periwinkle (*Littorina irrorata*) as the major food source of terrapins in North Inlet. Nesting sites have been identified with high depredation rates. Evidence of raccoons, foxes, and pigs have been found near depredated nests. No juvenile terrapins have been caught or seen during this study, although the size distribution of adults indicates recruitment.

ESTROGENIC LOAD IN EGG YOLK AND ALBUMEN

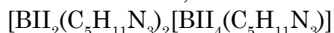
Brett Lackey and Sandra Gray

Endocrine Physiology Lab, Animal and Veterinary Sciences, Clemson University

Estrogenic load is the total exposure an animal or ecosystem has to estrogen and estrogen-like chemicals from hormonal, nutritional and environmental factors. Estrogenic load is a risk factor for developmental and reproductive abnormalities and diseases such as cancer in humans and animals.

Our laboratory has developed a validated method to quantify the amount of free and conjugated estradiol (glucuronidated and sulfated forms) in chicken egg yolk and albumen. Although conjugated estradiol is generally thought to be inactive at the level of the estrogen receptor (ER), the presence of deconjugating enzymes (glucuronidases and sulfatases) in the body and environment raises the possibility that conjugated steroids are metabolized to their active forms. Estradiol is considered the most potent hormonal estrogen, however, certain environmental estrogens, also called xenoestrogens, have greater potency and binding affinity to ER than estradiol. Extracts from egg yolk and albumen homogenates will be processed in ER binding assays with ERalpha and ERbeta to detect the presence of xenoestrogens. In addition to comparing the estrogenic load in chicken egg yolk and albumen with that of other animals, the steps required to validate an assay will be presented. Briefly, recovery, additivity and parallelism are three requirements of assay validation that must be satisfied to ensure the accuracy, precision and specificity of the experimental measurements.

SYNTHESIS, CRYSTAL STRUCTURE, AND UV-VISIBLE SPECTRUM OF



Single crystals of the title compound were prepared hydrothermally in ethanol using bismuth (III) iodide, 2,22:62,222-terpyridine (terpy) and ruthenium (III) iodide as starting materials. The compound crystallizes in the space group P-1, with Z = 2. Single-crystal X-ray analysis reveals that the asymmetric unit is composed of one full $\text{BiI}_2(\text{terpy})_2^+$ cation and one full $\text{BiI}_4(\text{terpy})^-$ anion. It is noteworthy that this compound is a rare example where both a cation and an anion iodobismuthate are incorporated into the same structure. Full details on the synthesis, crystal structure, and the UV-Visible spectrum will be presented.

A NUMERICAL STUDY OF JETS FROM TILTED BLACK-HOLE ACCRETION DISKS

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Relativistic jets are streams of plasma moving throughout the universe at speeds up to 99% the speed of light. They produce high-energy X-ray, radio, and visible radiation that are observable from great distances. Many of these jets are attributed to accretion disks - flattened, centrifugally supported gas structures - surrounding black holes. A disk gradually feeds (or accretes) material into a black hole through magnetic processes. Much of the energy released in accretion is radiated away, but some may power the jets. Otherwise the jets must be powered by the (spin) energy of the black-hole itself. The objective of our study is to determine what establishes the orientation of the jets in black hole accretion disk systems. We principally rely on direct numerical simulation for this research. Here we present results of high resolution, magnetohydrodynamic simulations of black hole accretion disks and relativistic jets.

SEMIOCHEMICAL BASED MANAGEMENT STRATEGIES FOR CIGARETTE BEETLES: ARE WE THERE YET?

Rizana Mahroof
South Carolina State University

Experiments were conducted to identify potential attractant/s for adult cigarette beetles, *Lasioderma serricorne* (F.). Seven out of sixteen test materials that displayed significant high attractive responses were further studied for (1) responses to whole extracts from three types of solvents and (2) the effects of sex and mating status of *L. serricorne* on responses to plant volatiles. Bioassays with extracts revealed that responses of *L. serricorne* varied among the type of solvent extract. Volatiles from different Capsicum products attracted significantly more adult beetles than did volatiles from other materials. When virgin males, virgin females and mated females were bioassayed, mated females responded significantly more than the other groups to plant volatiles. Volatiles emanating from 140 g of ground *Capsicum frutescens* L. were collected for 24 h on a SuperQ column, and the SuperQ was extracted with 2 ml of n-hexane. Extract was tested by a two-choice bioassay. About $58.0 \pm 2.6\%$ adult *L. serricorne* responded to the extract. Hexane extracts were fractionated by solid phase extraction method using hydrated SiO₂ columns and eluted with four types of solvents. Bioassays conducted using these extracts showed that diethyl ether fraction attracted significantly more beetles ($67.5 \pm 4.6\%$) than other three types of solvents. Diethyl ether fraction was again fractionated using a reverse phase sorbent. The second fractionation showed that the most attractive compound/s to beetles was eluted by 100% methanol. This paper further discusses on identification of Capsicum compounds using GC-MS analyses and field trapping of *L. serricorne* using Capsicum extracts combined with sex pheromone. Supported by USDA CSREES RAMP Agreement

EFFECTS OF 17 β -ESTROGEN, TAMOXIFEN AND POLYCYCLIC AROMATIC HYDROCARBONS ON HUMAN BREAST CANCER CELL VIABILITY

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The purpose of this research was to study human breast cancer cell viability following a short-term *in vitro* treatment with a natural estrogen, 17 β -estradiol (E₂), an anti-estrogen, tamoxifen (TAM) and polycyclic aromatic hydrocarbons (PAHs) fluoranthene (FLA) or benzo[a]pyrene (BAP). Tamoxifen has the structural conformation such that it resembles steroidal molecules located within the nucleus of cells. This enables it to attach to the estrogen receptors, and thus antagonize against molecules as estrogens. PAHs such as FLA or BAP are ubiquitous environmental contaminants, which may affect the reproductive tissues as potential endocrine disruptors. In this study we have tested potential role of these compounds on breast cancer cell viability. MCF-7 and T47D human mammary adenocarcinoma cell lines were obtained from American Type Culture Collection and routinely maintained in Dulbecco's Modified Eagle's/ F-12 media with 10% charcoal dextran-treated fetal bovine serum. Cells were cultured in a 5% CO₂ incubator at 37°C. The media was removed and replaced with 0.1% BSA containing media or media containing 0.01% DMSO (as vehicle) or in media with vehicle containing 10⁻⁶M E₂, 10⁻⁶M TAM, 10 μ g/ml FLA or 10 μ g/ml BAP. After 24 hours, cell viability was determined by MTT colorimetric assay. MCF-7 cell counts were high with 10⁻⁶M E₂. However, the difference in MCF-7 cell viability by various treatments did not appear to be statistically significant. On the other hand, T47D cell viability was only increased by 10⁻⁶M E₂ treatment; while the effects of other treatments were not statistically significant. These results suggest that tamoxifen, fluoranthene or benzo[a]pyrene had differential response from 17 β -estradiol. * Supported by NIH Grants GM068627, HD38342 and MD00233

TOXICITY OF TWO COMMONLY-USED PESTICIDES, CYFLUTHRIN AND CHLORPYRIFOS, TO *DAPHNIA MAGNA* IN 48-HOUR STATIC ACUTE TOXICITY TESTS

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This study attempts to quantify the toxicity of two pesticides, cyfluthrin and chlorpyrifos, to the cladoceran species, *Daphnia magna*. Cyfluthrin, known commercially as Baythroid®, is a synthetic pyrethroid insecticide commonly used on poultry farms in combination with the organophosphate insecticide, chlorpyrifos, to reduce the prevalence of chewing and sucking insects. Both pesticides act as insect neurotoxins. On local farms, these pesticides are introduced to the aquatic environment as rainwater soaks outdoor waste piles, and chemical-laden runoff enters local streams. This poses a potential risk to non-target aquatic organisms. Here, the toxicity of the aforementioned insecticides has been determined by using *Daphnia magna*, the common waterflea, in standard 48-hour static acute toxicity tests.

PATTERNS OF COMMUNITY SIMILARITIES OF FISHES OF THE EDISTO RIVER

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Patterns of community similarity were examined for fishes of the Edisto River. Data were collected during July of 2007 from five sites on the north fork of the Edisto River, four sites on the south and four sites downstream of the confluence of the north and south forks. Fish were collected at each site from a reach three times the mean width by electrofishing (Smith-Root LR-24 backpack shocker), seining and angling. Fishes were identified and released at site of capture (except *Lepomis* spp.). Dissolved oxygen, temperature, pH, and conductivity were measured at each site using YSI 556 meter. Mean flow was measured for each site at 60% of the mean depth using a Global Water FP201 flow meter. Patterns of community similarity were examined using global nonmetric multidimensional scaling and compared to four hypothetical topologies representing patterns of similarity expected under the assumption that habitat features, spatial structure, stream gradient, or climate factors act as primary determinants of fish community similarity. It was found that the pattern of fish community similarities were more closely related to the pattern of habitat structure than the other three topologies, indicating that the communities are not limited by dispersal.

TOXICITY OF DIELDRIN TO *DAPHNIA MAGNA* ACCLIMATED TO WATER AND SEDIMENT FROM A POTENTIALLY-CONTAMINATED CONSTRUCTED WETLAND

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Dieldrin is classified as a highly toxic synthetic organochlorine pesticide that was used on U.S. crops from the 1950s until 1970 and for termite control until 1987. Concentrations of dieldrin persist in the environment because of the low volatility, chemical stability and lipophilic properties of the compound. Dieldrin degrades very slowly in both soil and water resulting in high bioaccumulation. It binds to the soil and can remain unchanged for decades. Dieldrin is highly toxic to humans, mammals and aquatic life. This pesticide was recently detected in the soil of a newly constructed stormwater treatment wetland. Because of the toxic properties of this pesticide, it has the potential to be detrimental to aquatic life as this wetland develops. This study demonstrates the toxic effects of dieldrin to a population of *Daphnia magna* acclimated to water collected from this particular constructed wetland. The toxic concentrations determined by the experiment are then compared to actual pesticide concentrations detected in the wetland.

THE IMPORTANCE OF CALCIUM AND THE MP20 PROTEIN IN INSECT FLIGHT MUSCLE USING STRETCH ACTIVATION

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We investigated the importance of calcium in the control of flight physiology in insects, focusing on one particular protein, mp20, which is a calcium-binding protein and is present in some but not all insect flight muscles. We propose that the mp20 protein is important for flight physiology in basal (primitive) insects such as grasshoppers and dragonflies, but that during the course of evolution its function became dispensable because of changes in the flight mechanism, and that it is absent from more derived (evolved) insects such as beetles, wasps and flies. We propose that in asynchronous muscles, where calcium concentration remains constant throughout the muscle

shortening-lengthening cycle, the presence of mp20 would negatively affect the performance of the flight muscles, potentially rendering the insect flightless. We tested this hypothesis by evaluating the effect of artificially producing the mp20 protein in *Drosophila* asynchronous flight muscles. The mp20 cDNA from *D. melanogaster* was cloned after a flight-muscle specific promoter derived from the actin 88F gene. This should drive the expression of the protein in the asynchronous flight muscles. This actin-mp20 hybrid gene was then cloned with a P-element transformation vector and injected into *Drosophila* embryos. Transformants were selected and tested for mp20 expression. Expression results will be presented. We also conducted a phylogenetic study of the mp20 gene across different insect orders to test the correlation between the absence of mp20 and asynchronous flight physiology. Results and their significance in term of the evolution of asynchrony in different insect orders will be discussed.

RADIOACTIVITY CONCENTRATION OF RADON-222 IN TAP WATER

Stephanie Mitchum, Whitney Boston, Ashley Horton, Portia Griffon, Brittany Green,
Stacy Turner, and Zheng Chang
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A series of tap water samples have been extracted from a chemistry lab at South Carolina State University. After preparation of each liquid scintillation cocktail and extraction from the original water sample, each sample was analyzed by the Tri-Carb 2900 for ever one month. The data has been gathered and used to calculate the count rates of the Rn-222 at the sampling time and the half-life of Rn-222. It was found that the half-life was 3.83 days, which confirms the count rates we measured are attributed to Rn-222 and its progenies at decay equilibrium. From our analysis and incorporation of this prior data, we have been able to show a direct correlation between the temperature of the water sample and the activity concentration of the Radon-222. The activity concentration decreases with the increase of water temperature. The data also shows a relatively harmless average of 63.73 pCi/L at approximately 26°C. * Supported by South Carolina State University

COMPUTATIONAL MODEL OF PYRAMIDAL NEURON COMPUTATIONAL MODEL OF PYRAMIDAL NEURONS IN HIPPOCAMPUS OF MICE

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In order to study the mechanisms underlying the electrophysiological behavior of CA1 pyramidal neurons in the hippocampus of both a genetic animal model of schizophrenic (Dysbindine-1) mutant mice and their wild-type littermates, a conductance-based single-compartment Hodgkin Huxley based computational model is utilized. The mutant mice exhibit abnormal neuronal behavior, believed to be due to a lack of the glutamate receptors, namely the NMDA receptor. Calcium dependent currents and AMPA receptors (another glutamate ionotropic receptor) are also incorporated into the model because they are important for the normal electrophysiological behavior of these neurons. The computational model is used to simulate the administration of glutamate to the mutant mice, and the expected result is a more normalized neuronal behavior similar to the electrophysiological behavior observed on the wild type model. The model reproduces essential features of the hippocampal biological neuron and offers the basis for a large-scale study of networks involving CA1 hippocampal pyramidal cells. *Supported by MAYS Grant to Natasha New

EFFECTS OF RADIATIVE COOLING IN SIMULATIONS OF BLACK-HOLE ACCRETION DISKS

Joseph Niehaus and P. Chris Fragile
College of Charleston

The environment of black holes, which are gravitationally collapsed objects, is one of the best places to test the effects of strong field gravity, one of the four fundamental forces of Nature. To do this astronomers observe electromagnetic radiation (light) given off by gas swirling around the black hole in the form of an “accretion disk” - a flattened, centrifugally supported structure. In order to interpret what astronomers are seeing it is helpful to construct computational models of these disks. Unlike previous such models, ours explicitly include the major radiative processes involved: bremsstrahlung, synchrotron, and inverse-Compton. Thus our simulations should provide a more accurate physical picture of what is happening and give us a means to directly link our simulations to observations.

IMAGE ANALYSIS TECHNIQUES IN PHASE SEPARATION IMAGES RECORDED IN MICROGRAVITY

Ana Oprisan, Sorinel Oprisan, Greg Smith, John Hegseth¹, Yves Garrabos²,
and Daniel Beysens²

College of Charleston, ¹University of New Orleans, ²University of Bordeaux, France

A series of experiments were performed using the Alice II apparatus in microgravity to study phase separation near critical temperature. The compressibility of a fluid is very large near critical temperature and a sample of critical fluid will stratify under its own weight in a gravitational field. For this reason experiments are performed in microgravity to suppress the effects gravity observed on Earth. Fluctuations near the critical point cause local variations in the intensity of transmitted light. By analyzing the images from the Alice II experiments we were able to investigate the behavior of fluids near critical point in a microgravity environment. Critical fluctuation images are very sensitive to optical noise. Employing different image filters including the Gaussian, Wiener, adaptive, and n-point filters to denoise the images, enabled us to find the optimal techniques for enhancing these images. After the denoising process we were able to determine the fractal dimension of the phase separating domains. The size of the phase separating clusters was also found using image feature analysis. Supported by College of Charleston MAYS grant

CLONING OF A HAMMERHEAD RIBOZYME TARGETED TO THE HIV-1 LTR

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In the US, the Acquired Immune Deficiency Syndrome (AIDS) is one of the nine leading causes of death. The causative agent of AIDS is the Human Immunodeficiency Virus (HIV-1). Since its discovery in 1982, the Centers for Disease Control (CDC) has estimated that the number of individuals infected with this virus had reached 1.1 million by 2003. In 2005 the CDC estimated that the cumulative number of AIDS cases had reached 984,000 and accounted for more than 550,000 deaths. HIV-1 is a lentivirus that encodes nine regulatory and three structural genes. Reverse transcription, provirus integration, and transcription are controlled by the 5' and 3' long terminal repeat (LTR) regions. Each LTR consists of a U3, R and U5 region. The 5' U3 region contains the viral enhancer and promoter sequences. The R region is the first transcribed region of the HIV genome and contains the trans-activating response element (TAR). This element is important

because it is bound by the HIV-1 tat protein, which enhances transcriptional elongation. Because the 5' R region is a part of all HIV transcripts, it is a prime target for inhibition by hammerhead ribozymes. Hammerhead ribozymes are small catalytic RNAs that can be designed to specifically cleave viral RNAs. A hammerhead ribozyme was designed to target the HIV LTR at nucleotide 571 within the HIV-1 subtype NL43 (Accession # M19921). The ribozyme template was converted to dsDNA by amplification and cloned into pPCR-Script. The ligation reaction was used to transform XL10 ultracompetent cells, which were plated onto LB/ampicillin containing X-Gal and IPTG. The resulting colonies were screened for the presence of the ribozyme sequence by PCR using plasmid-specific primers. Ribozyme orientation was determined by PCR using a combination of plasmid-specific and ribozyme-specific primers. Sequencing will be used to verify the clone.

DEPTH DOSE VERIFICATION OF A GEANT4 SIMULATED RADIATION THERAPY TREATMENT HEAD

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USC Columbia

I will present a GEANT4 simulation that was created in order to study the beam characteristics of a radiation therapy machine similar to one that is currently in use at medical facilities. The GEANT4 toolkit was chosen for its usefulness in simulating particle transport throughout user defined geometrical regions. Our simulation includes most of the major components present within a medical linear accelerator (linac) head, including the target, primary collimators, flattening filter, and movable secondary collimators; the multi-leaf collimator was omitted to speed development and event simulation times. Verification was done by comparing the output with percent depth dose (PDD) data of a 10 MV x-ray beam incident on a simulated water phantom, with data analysis being done using the ROOT object-oriented data analysis framework. Construction of the linac head was done in accordance with technical specifications listed for a Varian Clinac 2100CD. Our results for simulated 10 MV beams incident on a water phantom with a field size of 10x10 and 6x6 cm² and source to surface distance (SSD) of 100 cm led to an overall chi-squared fit value of ~ 1.83 with generally accepted depth dose data. Further analysis includes an inquiry into the beam profile at various depths within the water phantom, and a brief discussion of the usefulness of this simulation as a research tool.

SYNTHESIS AND CRYSTAL STRUCTURES OF SOME INORGANIC-ORGANIC HYBRIDS CONTAINING FLUOROSACCHARINATE

Larnelle Peterson and Pete Peterson
Francis Marion University

Three inorganic-organic hybrid solids of the general formulas $M(\text{fluorosaccharinate})_2(\text{H}_2\text{O})_4$ and $M(\text{L1})(\text{fluorosaccharinate})_2(\text{H}_2\text{O})_4$ [$M = \text{Ni (II), Co (II), Zn (II)}$; L1 = 1, 4-bis(4-pyridyl)-2,3-diaza-1,3-butadiene] have been synthesized and characterized by single crystal X-ray diffraction. The Ni(II) solid consists of discrete complexes of octahedrally coordinated Ni(II), while the Co(II) and Zn(II) structures feature one-dimensional chains composed of octahedrally coordinated Zn(II) or Co(II) ions that are linked by L1. In the latter two compounds the fluorosaccharinate anions are uncoordinated. Further, pairs of fluorosaccharinate anions aggregate such that their fluorine atoms are in close proximity. This interesting feature as well as the synthesis and infrared studies will be discussed.

HOW DO INSECTS FLY: BIOINFORMATICS ANALYSIS OF THE MUSCLE PROTEIN PROJECTIN

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Using data mining tools and molecular biology techniques we isolated and characterized the gene for projectin in several insects belonging to different orders. We will focus our discussion on the analysis of the *Drosophila virilis* and *Acyrtosiphon pisum* genes. *Acyrtosiphon pisum* represents a relatively basal insect (order: Hemiptera), whereas *Drosophila* belongs to the more derived Diptera order. Both insects use asynchronous flight muscles that are characterized by multiple contractions per nerve impulse, a process made possible by stretch-activation and high resting stiffness. Stretch activation is a general property of striated muscles, but is physiologically relevant in only two muscle types: vertebrate cardiac muscles and insect asynchronous flight muscles. Data will be presented describing the gene annotation process, the analysis of the gene structure (exon-intron pattern), and its evolution from basal to derived insects. The protein contains a special amino acid region called the PEVK domain, which is thought to be responsible for elasticity and resting stiffness. A comparison of this domain across insect orders will be presented together with a phylogenetic analysis.

COMPARATIVE ANALYSIS OF *CLOSTRIDIUM PERFRINGENS* BACTERIOPHAGE

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Clostridium perfringens, a Gram-positive bacteria, is a major bacterial cause of food-borne disease among humans. Food poisoning as a result of exposure to *perfringens* is responsible for approximately 20% of all known food-borne disease outbreaks. This anaerobic bacteria can also be held accountable for necrotic enteritis among chickens. Pathogenesis and symptoms of an infection can be determined by the toxins produced by *C. perfringens* strain type A or C. Although this is not a current problem for the poultry industry, it may possibly become a severe issue if antibiotics are withdrawn from animal feed. Therefore, the potential applications of lytic bacteriophage and their enzymes have become extremely interesting in the veterinary, medicine and bioindustry fields. Research centered around bacteriophage lytic for *C. perfringens* may lead to the discovery of new antimicrobial agents, phage lytic enzymes. In an effort to contribute to the discovery of new antimicrobial agents, we used several techniques to compare four *C. perfringens* isolates, Cp13, Cp26, Cp34 and Cp39, and their specific bacteriophage, fCp13-O, fCp26-F, fCp34-O and fCp39-O. Methods: *C. perfringens*-specific bacteriophage was propagated utilizing a plate lysis method under anaerobic conditions. The bacteriophage genomic DNA was purified from the plate lysates by several centrifugations along with separation over a sucrose gradient. The pelleted phage was then suspended in PBS. Purity of the various bacteriophages were examined by electron microscopy and protein analysis. The bacteriophage pellets were also subjected to a proteinase K digestion and a phenol/chloroform extraction. The *C. perfringens* bacteriophages were screened against all test hosts. Results: A number of protein regions was determined to be common to all four *C. perfringens* bacteriophages tested. The bacteriophage genomic DNAs showed great specificity for their host. Only one phage was able to infect and lyse more than a single target strain, fCp39-O. Conclusion: Electron micrographs showed that all of the

bacteriophage had similar physical characteristics. This phage was able to lyse its host, Cp39 and Cp26. Southern Blot and Proteomics Analysis showed nucleic acid and protein similarity among bacteriophage.

STRONG BASE MULTIPLE ANION PREPARATION OF NEW SPIRO-HETEROCYCLES CONTAINING BENZISOTHIAZOLE DIOXIDE WITH PYRAZOLES OR ISOXAZOLES

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A variety of dilithiated C(alpha), N-carboalkoxyhydrazones or dilithiated C(alpha),O-oximes were condensed with methyl 2-(aminosulfonyl)benzoate to afford intermediates that were isolated and cyclized, or cyclized directly to either of the two types of new spiro-heterocycles. Intermediate compounds from the hydrazine ester-sulfonamide condensation were isolated and not characterized but cyclized with acetic anhydride, which also included an N-acetylation. The structural elucidation of the new spiro(N-acetylbenzothiazole dioxide-N-carboalkoxyprazoles) products was based upon absorption spectra and confirmed by X-ray crystallographic analysis. Mechanistic intermediates to describe the reaction may include C-acylated intermediates that cyclize to spiro(N-acetylbenzothiazole dioxides - carbomethoxyhydrazones) instead of N-carbomethoxypyrazole-ortho-benzenesulfonamides. Intermediate compounds from the oxime ester-sulfonamide condensation were not isolated but cyclized directly with dilute hydrochloric acid to give spiro(benzisothiazole-isoxazole)dioxides instead of isoxazole-ortho-benzenesulfonamides. X-ray crystallographic analysis was also important to confirm the structure of these compounds.

AN EXPERIMENTAL INVESTIGATION OF THE DISCHARGE COEFFICIENT FOR AN ORIFICE IN A CIRCULAR PIPE WALL

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We investigate the discharge coefficient (Cd) for a variety of different shapes of orifice cut into a vertical circular pipe. A full understanding of the discharge coefficient is important in order to accurately predict draining rates out of riser pipes in water holding ponds and reservoirs. A series of experiments were conducted to investigate the variation in discharge coefficient as a function of the orifice size, pipe diameter and depth of water above the orifice. A novel experimental technique was developed to measure Cd while draining a tank through the orifice. The depth of flow in the tank was calculated by measuring the hydrostatic pressure at the base of the tank, while the flow rate through the orifice was calculated by measuring the rate of decrease of water depth over time. The discharge coefficient is found to be a function of the ratio of the water depth (H) above the orifice centerline and the vertical height (h) of the orifice, the ratio of the horizontal extent of the orifice (r) and the pipe radius (R), and the orifice shape. Experimental results for Cd as a function of h/H and r/R are presented for a variety of orifice shapes.

TEMPORAL AND SPATIAL VARIATION OF ABUNDANCES OF COMMON BENTHIC INVERTEBRATES IN THE LYNCHES RIVER, SOUTH CAROLINA.

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Basic to our understanding of stream benthic community ecology is temporal and spatial variation of abundances of the major groups of invertebrates. Monthly sediment cores were taken for one year from a sandy point-bar in the Lynches River, SC. The 4 cm deep cores were sectioned in 1 cm intervals. Fauna were extracted from each section, counted, and identified to major taxon. As part of a larger study, 14 physical parameters were measured for each core section, including, in part, the coordinates in three dimensions, current speed, and sediment composition. Members of six phyla, divided into 17 major taxa, were found at the site. The most common groups were midge larvae (Chironomidae, Diptera, mean=29,700/m²), Oligochaeta (18,400/m²), Nematoda (2,600/m²), and Harpacticoida (1,700/m²). Midge larvae showed significant variation temporally while the other three groups did not. Spatially, midges and oligochaetes varied significantly in abundance with depth in the sediments. For midges there was no difference in abundance along the shoreline coordinate, or distance from shore. However, for oligochaetes there was a significant difference in abundance along the shore and no difference with distance from shore. In general, there was a high diversity of invertebrates, examined at higher taxonomic levels, and high variance in numbers, often resulting in non-significance in changes of abundance spatially and temporally.

OPTIMIZING TITER OF A RETROVIRAL VECTOR EXPRESSING AN ANTI-HIV-1 TAT HAMMERHEAD RIBOZYME

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The Human Immunodeficiency Virus (HIV-1) is a lentivirus that targets the lymphatic system by infecting CD4+ T-helper cells and macrophages. Infection leads to a dramatic decrease in the number of T-helper cells, resulting in the onset of the Acquired Immune Deficiency Syndrome (AIDS). The HIV-1 genome expresses a small regulatory gene, tat, which acts to increase transcription from the viral promoter. Tat is therefore essential for HIV replication and an important target for antiviral agents such as hammerhead ribozymes. A model for the design of hammerhead ribozymes was first described by Haselhoff and Gerlach. This model consists of two flanking regions that bind to an RNA substrate in a complementary manner along with a catalytic core that facilitates cleavage at the target site. We have previously cloned and tested the catalytic activity of a library of three hammerhead ribozymes targeted to HIV-1 tat. One of these Tat5910 and Tat5910 non-catalytic control, were chosen for further testing in a cell model. To initiate these studies Tat5910• was cloned into pSuperRetroGFP+Neo to form the retroviral vector pSR5910". In this vector Tat5910• will be expressed from a RNA Polymerase III promoter. To determine the ability of this retroviral vector to produce viral particles, 293T cells were transiently transfected using CaPO4 and a three plasmid system, pVPackgagpol, pVPack-VSV-G, and pSR5910". After 48 hours the viral particles contained in the medium were collected, filtered using a 0.45 µm syringe filter, and stored at -80oC. GFP expression in these cells was 0.45 observed indicating successful transfection. To test for virus presence, NIH3T3 cells were transduced with a one milliliter of the virus-containing medium. After 48 hours, the transduced cells indicated GFP expression indicating successful virus transduction. Virus titer is a measure of the total number of virus particles per unit volume of virus-containing medium; therefore higher titers result in greater numbers of transduced cells. Although titer can be affected by several conditions,

optimization is generally a function of the titer, we are currently carrying out experiments that involve altering three different transfection variables: the ratio of helper plasmid to retroviral vector, the elapsed time the transfection reagents are in contact with the cells, and the pH of the transfection reagents.

POPULATION DYNAMICS OF *FUSARIUM* SPECIES FOUND IN SOILS AT THE COKER HISTORICAL FARM IN HARTSVILLE, SOUTH CAROLINA.

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¹Monsanto Corp. (formerly Delta and Pine Land Company)

Due to the recent and dramatic rise in the value of corn, mainly due to its use in ethanol-based biofuels, farmland dedicated to maize cultivation is expected to increase. The price of a bushel of corn has more than doubled in the past two years. Due to this increased incentive, farmers are planting maize in fields that have typically been planted with other crops, perhaps for decades. The results reported reflect the first year of a multi-year study to examine changes in population dynamics of soil microbial communities following the introduction of a new crop. Specifically, we chose to monitor populations of *Fusarium*, an important genus of plant pathogenic fungi. We predict that populations of *Fusarium* in soils continuously cultivated with a single crop will change as a new crop is introduced. Field plots at the Coker Historical Farm have been planted, up until 2007, exclusively with cotton (*Gossypium hirsutum*) for the past several years. In spring of 2007, six commercially available varieties of corn (*Zea mays*) were planted in a strip-plot design, immediately adjacent to 12 commercial cotton varieties. Soil cores (15cm deep) were collected from arbitrarily chosen sites within the field plots (100 from each), 12cm away from the center of the plant shoot at three intervals during the growing season (26Jun., 7Aug., and 3Sep.). To determine the identity and occurrence of *Fusarium* species found in samples collected from both cotton- and corn- cultivated fields, we plated 1g of each soil sample onto *Fusarium*-selective medium, malachite green agar (Castellá et al., 1997). Based on morphological identification, *Fusarium* isolates were found in every soil sample with concentrations ranging from 10^2 – 10^4 colony forming units per gram of soil. No differences in *Fusarium* population levels could be observed between cotton- and corn-cultivated field plots. We are currently isolating genomic DNA for molecular identification via internal transcribed spacer (ITS) sequences or other nuclear gene sequences to catalog the *Fusarium* species isolated in this study.

USING MATHEMATICAL METHODS TO EXTRACT DIFFICULT TO MEASURE VALUES OF PDT

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Photodynamic therapy (PDT) is an FDA-approved method of treating Barrett's esophagus with high-grade dysplasia, a condition that has been shown to be a precursor of esophageal adenocarcinoma. PDT involves the administration of a photosensitizer that interacts with red light and oxygen in a chemical reaction that leads to ablation of the esophageal mucosa. Currently a significant number of patients are either under treated, leading to residual disease, or over treated, leading to complications. Our group has developed a multilayer optical model of the esophagus and a Monte Carlo program to simulate the treatment in order to optimize the PDT light dose. Effective use of the simulation requires

knowledge of the photosensitizer concentration in each patient. A member of our group (JB) has collected reflectance spectra for tissue phantoms with known concentrations of blood, Intralipid and Photofrin (PF). The goal of this project is to use mathematical methods to extract the known concentration of PF from these phantoms. Analytical methods include Principal Component Analysis (PCA) and Partial Least Squares Regression. The long-term goal is to develop a non-invasive method to estimate the PF concentration for clinical treatment. Supported by NIH Grant 1 R15 CA120106-01A1

A MULTI-LEVEL RISK ASSESSMENT OF WOMEN LIVING WITH HIV/AIDS IN KENYA

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Sub-Saharan Africa remains one of the most affected regions for HIV/AIDS and 61% of those affected are women. Kenya is one of the countries where women are disproportionately affected. The study was conducted in the summer of 2006 in Gatundu, a district with one of the highest rates of HIV/AIDS. Partnerships developed between Kenyatta University and community workers in Gatundu were used to select the study site, obtain participants, and translate data. A multi-level risk assessment of susceptibility to HIV/AIDS was conducted among fifteen women with HIV/AIDS and 15 controls which included a survey of socio-demographic and cultural practices, 24-hour dietary recall and eating habits. Further, anthropometric indices and biochemical indicators of health were also assessed. HIV tests confirmed that women in the experimental group, aged 27-60 years old, were HIV positive with average CD4+ counts of less than 300. More women in the experimental group were in polygamous marriages or single, and had a lower percentage of contraceptive use. Forty percent reported not using anti-retroviral drugs due to lack of access to health care facilities. Eighty seven percent of the women reported that the disease affected their physical and mental health. Dietary survey results indicated that the total calories, protein and calcium intake were inadequate due to lack of food. Our data illustrates that societal and cultural factors play a significant role in susceptibility to HIV/AIDS and poor nutrition further enhances this susceptibility. A multi-level risk assessment is important in determining health of women and a holistic intervention strategy needs to be implemented to reduce the risk.

SYNTHESIS AND CRYSTAL STRUCTURES OF SOME ZINC (II) AND CADMIUM (II) FLUOROCARBOXYLATE INORGANIC-ORGANIC HYBRID SOLIDS

Diana Rishmawi and Pete Peterson

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Polycarboxylates represent a versatile class of ligands for the construction of inorganic-organic hybrid materials with potentially useful properties. To this end, we have prepared and determined the crystal structures of three such solids, tetraaqua di-3-fluoropyridine-4-carboxylato zinc(II) (1), diaqua bis- 5-fluorosalicylato zinc(II) (2), and poly[diaqua 3-fluorophthalato cadmium(II)] (3). While 1 and 2 are discrete complexes of octahedrally coordinated Zinc (II), the crystal structure of 3 consists of polymeric sheets formed by the bridging of octahedrally coordinated Cd (II) by carboxylate oxygen atoms of the 3-fluorophthalate ligand. The synthesis and X-ray structural studies of these materials will be discussed.

DEVELOPMENT OF SEVERE WEATHER IN THE EASTERN UNITED STATES

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The NCEP/NCAR Reanalysis Data Set is a large collection of atmospheric data spanning from the 1940s to the present. The National Centers for Environmental Prediction is a NOAA project and the National Center for Atmospheric Research is run by the NSF funded University Corporation for Atmospheric. The data, which is world-wide in scope, is in the form of maps which present a spectrum of atmospheric data. It includes daily values for surface parameters such as precipitable water and precipitation rates. It also includes geopotential height, relative and specific humidities, air temperature, and vector wind from the surface up through several layers of altitude. This project focuses on three tropical Atlantic Hurricanes and three so-called Nor'easters—specifically the February 1978 Nor'easter, the Late November 2006 Nor'easter, the April 2007 Nor'easter, Hurricane Hugo, Hurricane Fran, and Hurricane Isabel. The plan is to investigate daily values of sea surface temperature and precipitable water gathered at points roughly 100 miles ahead along the projected path of each storm. Nor'easters and Atlantic Hurricanes are both quite alike and quite different. Accordingly, the research seeks to determine the relative effects of these two specific parameters on these two different types of storms. This talk will present a progress report on this work as well as some of the preliminary findings.

SYNTHESIS AND CHARACTERIZATION OF $Tl_2Ba_2Ca_6Cu_7Ox$

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A modified solid-state reaction is used to synthesize multi-layer thallium-based high T_c superconductors with 7 layers of copper. The resulting compounds were investigated by electron microscopy (SEM) and EDAX and were tested for superconducting transitions. A four-probe method is used for characterization for measuring transition temperature. Temperature-dependent of conductivity and superconductivity will be reported.

DETERMINATION OF MARK-HOUWINK CONSTANTS FOR PET IN ETHYLENE CARBONATE"

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Intrinsic viscosity (IV), as an indirect measure of polymer molecular weight, can be determined in minutes, making it suitable as a process control and trouble shooting tool. Polymer IV data, in mL/g, comes from comparison of the flow time of a dilute polymer solution through a capillary to that of the solvent at a fixed temperature. The IV of the polymer may be related to its viscosity-average molecular weight, M_v , by the Mark-Houwink equation: $IV = K[M_v]^a$, provided the constants K and a have been determined for that polymer in that solvent at the test temperature.

For poly(ethylene terephthalate) [PET], the commonly used IV test solvents have one or more undesirable characteristics such as acidity, corrosivity, toxicity or high cost. An alternative solvent, which overcomes these deficiencies, is ethylene carbonate [EC], which is aprotic, polar, and high boiling. EC is also non-corrosive and relatively non-toxic. In order to use EC an IV test solvent, it was necessary to determine the constants "K" and "a" for the Mark-Houwink equation. Using samples of PET (provided by Mitsubishi Polyester Film) spanning a wide molecular weight range, flow times for three concentrations of each of the three standards at three temperatures were obtained and

compared to flow times for pure EC. From the flow data, the IV of each standard was determined. A plot of $\log(\text{IV})$ vs. $\log(\text{MW})$ gave a straight line. The slope of the line was the constant “a” and the value of the Y-intercept was “K”. For Mitsubishi to use this new method, a correlation between the “old” IV test values and the new EC-based test results must be established (in-progress). Finally, for a class of copolyesters that are dispersible in water, it should be straightforward to determine K and a for those polymers using water as the solvent, provided appropriate standards of known molecular weight are available.

UNIQUE ANATOMICAL AND CHEMICAL FEATURES OF NONGLANDULAR TRICHOMES IN BIG MOUNTAIN SAGEBRUSH: A PROPOSED HEAT-SINK MECHANISM TO CONTROL LEAF TEMPERATURE AND WATER CONSERVATION

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Artemisia tridentata (ssp. *vaseyana*), also known as Big Mountain Sagebrush, and other similar species grow in cold deserts of North America and other continents. The surfaces of the leaves, young stems, and flower buds are densely covered with T-shaped nonglandular trichomes (hairs) which are not remarkably shiny or reflective in appearance. Microscopy and histochemical studies of the hairs reveal a stalk consisting of several living cells stacked vertically. These cells have walls heavily impregnated with a lipophilic substance (probably suberin). However, each end wall has a lipophilic-free zone or opening. Attached to the top stalk cell is a large, laterally elongated apical cell (the top of the T-shape) that physically provides a protective canopy over the underlying epidermal surface and glandular secretory trichomes. The cell wall of the apical cell is thick, but it is not impregnated or coated with lipophilic material. Otherwise, the cell wall appears to be more or less similar to typical plant cell walls. The cytological appearance of the mature apical cell suggests that it is nonliving and full of loosely fibrous material consisting of polysaccharides. Temperature in pubescent leaves of most desert plants, in great part, is known to be controlled by surface reflectance of radiant energy. A unique and dynamic model (but with possible general applicability) involving cellular compartmentation, regulation of bulk water flow, water and heat absorption, evaporation and visible light transmission will be presented to support a novel hypothesis that heat-trapping (heat-sink)—rather than radiant energy reflectance—is the primary temperature control function of leaf hairs in Big Mountain Sagebrush and possibly other desert plants species only capable of moderate surface reflectance.

COALESCING AXISYMMETRIC TURBULENT JETS

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We present preliminary experimental results of a study into the coalescing of a pair of axisymmetric turbulent jets. An understanding of this flow is important in analyzing the behavior of diffusers in agricultural and industrial applications. Previous work on this problem has been largely theoretical and assumes that the two jets develop independently of each other and coalescence occurs due to the radial spread of the jets due to ambient entrainment. However, it has been shown (Kaye and Linden 2005) that, for buoyant jets, each jet’s centerline is deflected toward the other due to the ambient entrainment field. Our experiments are designed to examine whether this jet bending

occurs in neutrally buoyant jets. A series of experiments have been conducted in a 2m by 3m tank filled to a depth of 1.5m. Two axisymmetric turbulent jets ($Re \sim O(10,000)$) were introduced in the side wall and velocity profiles measured along the axis of symmetry. Preliminary results indicate that the entrainment driven drawing together of the jets is less pronounced than for buoyant jets. A theoretical model is being developed to explain this phenomenon.

SEED PRODUCTION IN 40 VASCULAR PLANT SPECIES

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The objective of this study was to determine the number of seeds produced on a flower and on the total number of seeds produced on an individual plant. Seeds produced in one to 100+ flowers from 40 vascular plant species were collected and counted. Total seed production in one to three individual plants in each of the 40 species was determined. In plants that produced hundreds or thousand of seeds/flower, the total number of seeds produced/flower and the total number of seeds produced per plant were calculated by employing a simple proportion equation. One hundred to five hundred (tiny) seeds were counted and weighed; the total number of seeds produced/flower was also weighed, the unknown component of the equation. The number of seeds ranged from 2/flower in *Diodia virginica* to 10,000 seeds/flower in *Monotropa uniflora*. The number of seeds produced/plant ranged from 24 in *D. virginica* to over 500,000 in a clone of *Aster simplex*. Future work in this study may focus on carbon allocation in seed production as well as resource partitioning in sexual reproduction.

A PRELIMINARY STUDY OF THE VASCULAR FLORA AT THE LEVY PRESERVE, NASSAU COUNTY, NEW YORK

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The Levy Preserve, established in 2000 as a nature preserve, is a 21 hectare park in Nassau County, New York. The preserve was surveyed for vascular plant species at two week intervals beginning May 2007, terminating October 15, 2007. The site is situated on an old landfill, bordered on three sites by salt marsh. Over 350 specimens were collected. The preliminary vascular flora consists of 180 species in 143 genera in 56 families. One hundred and thirty nine dicot species, 40 monocot species, and one *Gymnosperm* composed flora. The largest of the families of the flora were the *Asteraceae* (29 species) and *Poaceae* (25 species). Together non-native vascular plant species composed 53.3% of the flora. *Artemisia vulgaris* and *Phragmites australis*, both non-native taxa, were the most common species at the preserve. The three year study will end October 31, 2009.

A PRELIMINARY OF THE VASCULAR FLORA AT THE BROOKHAVEN NATIONAL LABORATORY, LONG ISLAND, NEW YORK

R. Stalter, J. Velovic, E. Lamont, A. Jung, A. Alphonese, E. Youssef, A. Chaudhry
and G. Grigoryan

Department of Biology, St. John's University

Brookhaven National Laboratory, composed of 5,500 hectares is located in Suffolk County, Long Island, New York. The objective of this preliminary three year study was to survey the vascular plant species at the laboratory grounds, and, to define and describe the

major plant communities at the site. The preliminary vascular flora consists of 278 species, 201 genera, and 83 families. Two hundred and three species, 73% of the flora, were native to the region. The largest families in the flora were the *Poaceae* (32 species) and *Asteraceae* (37 species). The *Cyperaceae* with 15 species was the third largest family. Seven major plant communities exist here: oak woodland; pine/oak woodland; ruderal (disturbed sites); successional fields; planted pine plantations; ponds; streams and wetlands; and the Gamma Forest, Woodwell's Ce 137 irradiated pine/oak woodland.

DEVELOPMENT OF A REACTOR FOR BIOHYDROGEN PRODUCTION

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The U.S. economy currently depends on a transportation system which is heavily reliant upon the petroleum based internal combustion engine. The combustion of carbon based fuels is suspected to be responsible for global warming and chronic air pollution. Large bodies of evidence are being presented which indicate that efforts should be made to move toward more environmentally friendly and renewable energy sources. This has lead President Bush to issue his "Hydrogen Initiative" in his January 28, 2003 State of the Union address. The President's plan is "to make our air significantly cleaner, and our country much less dependent on foreign sources of energy" through the development of hydrogen based fuel technologies.

The long range goal of our research is to develop a biohydrogen reactor capable of utilizing agricultural feedstocks and microbial digestion. We plan to study the fundamental biotransformation of agricultural feedstocks including switchgrass into hydrogen by hydrogenase enzyme producing bacteria found in the waste of livestock. Hydrogen has several advantages over finite-supply fossil fuel as a future source of energy for the world's economy: (1) unlimited and renewable supply located in the biomass found in potential waste feedstocks such as grass clippings, woodchips, municipal solid waste, and vegetation from constructive treatment wetlands. (2) combustion produces water instead of carbon dioxide, which has been implicated as a source of global warming. (3) Using waste biomass for energy production also avoids the use of landfills for waste disposal. The work is being performed in the newly established "Biomass and Renewable Fuels Laboratory" which is located within "The Center for Energy Studies" on the campus of South Carolina State University.

THE HISTORY OF THE SOUTH CAROLINA ACADEMY OF SCIENCE

David J. Stroup

Francis Marion University

The South Carolina Academy of Science (SCAS) was organized in 1924 under the direction of Dr. G.C. Mance, Professor of Geology at Winthrop College. In 1927, the academy affiliated with the American Association for the Advancement of Science. Publication of the Bulletin of the Academy began, and in 1973 the SCAS Newsletter was established as a vehicle for communication among members. Beginning in the 1960s, industry and business joined academic institutions in support of the Academy and have helped to set goals to aid and improve the development of science in South Carolina. The South Carolina Junior Academy of Science was founded by Dr. John Michner in 1969 and the Middle School/Elementary School Academy was founded by Dr. Don Jordan in 1991. The first issue of the peer reviewed, electronic, Journal of the South Carolina Academy of Science was published in the Fall of 2003. The Academy is dedicated to raising the level of science education in South Carolina and to promoting research and the transmission of

knowledge within the State. The Academy of Science is the only statewide interdisciplinary science organization whose membership includes high school students, teachers and administrators, college students, professors, scientists, related professionals, parents of students, college presidents, business executives, small and large businesses, financial institutions, and institutions of higher education. One reason for this broad spectrum of support for the Academy is that individually and collectively, members share a deep commitment to promote research and to stimulate the creative abilities of senior scientists and the youth of our State.

OPTICAL CHARACTERIZATION OF A NEW SUNSCREEN

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Exposure to solar ultraviolet light is extremely harmful to normal human skin. Prolonged exposure of UV light may lead to sunburn, photoaging and skin cancer. Although there are several sunscreen products available in the market, most sunscreens do not protect the skin from the longer UVA wavelengths (320-400 nm). The major objective of this work is to investigate the optical absorption characteristics of a not yet FDA approved sunscreen ingredient in the 200 nm-750 nm spectral region. The sunscreen lotion mixture contains the following ingredients in order of decreasing percentage in relation to the total: glycerin, propylene, purified water, luminex, titanium dioxide, nonoxynol, carbopol, and triethanolamine. The sample is diluted to a concentration of about two percent sunscreen and then exposed to a Xenon lamp for different time durations in an effort to simulate the daylight conditions. The unexposed freshly prepared sample has strong absorption peak at around 298 nm. Approximately, 50% of light is absorbed in the UVA region, whereas the absorption is about 75% in the UVB region. However, upon exposing to 2hrs to white light, the absorption reduces to about 60%. Additional absorption features at 278 nm and 335 nm have also been observed at this point revealing the production of new compounds as result of photoreaction. The absorption reduces to about 61% upon exposing to 6 hrs. A detailed study to analyze the chemical reaction products is currently underway.

HYALURONAN ANTAGONISM IN GLIOMA PROGENITOR CELLS

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Malignant gliomas such as glioblastomas (GBM) are associated with a dismal prognosis because of their resistance to radiotherapy and chemotherapy. From GBM cell lines and fresh human GBM we have isolated subpopulations of progenitor cells that are enriched with multi-drug transporters. C6 side population (C6SP) cells which are enriched for the drug transporter ABCG2 (BCRP, breast cancer resistance protein) have malignant properties regulated by hyaluronan (HA), a large pericellular glycosaminoglycan. C6SP cells have increased expression of stromal-derived factor 1 (SDF1), which may enhance homing of host progenitor cells toward glioma cells. Preliminary studies using HA oligomers (o-HA) to antagonize hyaluronan activity in C6 gliomas *in vivo* show suppression of tumor growth and decreased recruitment of neural and hematopoietic

progenitors in the tumors. The purpose of this study was to characterize the effects of o-HA on C6SP gene expression with particular attention to differential expression of SDF1 and other factors such as stem cell factor (SCF) that could mediate a cellular homing response in gliomas in vivo. The results of this study will identify gene expression factors under glioma HA control that may mediate homing of brain-derived and blood-derived cells using the treated and untreated C6 SP cells. To determine the differences in gene expression by microarray analysis in C6SP, we isolated RNA from six samples (three untreated controls and three o-HA treated). C6SP RNA was purified using RNeasy spin columns. The RNA was then subjected to gene chip microarray analysis for differential gene expression. The results of this study will identify candidate factors under glioma HA control that may mediate homing of brain-derived and blood-derived cells.

SPECTROSCOPIC CHARACTERIZATION OF A FLUORESCENT ANTHRACENE-TRIAZOLE-IMINODIACETATE DYE AS A METAL-ION SENSOR

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The Cu(I)-catalyzed azide-alkyne cycloaddition reaction, a prototype of click chemistry, has been used to synthesize a new fluorescent, water-soluble triazolyl anthracene dye for potential use as a metal-ion sensor. The fluorescence modulation of the dye in the presence of a series of metal ions of varying concentration was evaluated. The dye undergoes the strongest fluorescence quenching in the presence of micromolar concentrations of the first row transition metals Cu(II), Fe(III), Ni(II), and Co(II). Significant fluorescence quenching also occurs with Cd(II). There is no change in fluorescence in the presence of group IA and IIA metal ions. Additional studies were conducted to determine the nature of the binding between dye and metal ion. Binding curve data show 1:1 binding for the dye-metal complex, and the binding constants obtained from the curves correlate well with the degree of fluorescence quenching. Fluorescence titration experiments with EDTA demonstrate that the dye can be used to quantitatively determine metal ion concentrations in solution. This work is supported by NSF grant no. EPS-4007660

EXTREMOPHILIC TEMPERATURE ADAPTATION IN LUCIFERASES; TEMPERATURE BIOSENSORS

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Psychrophilic organisms have a growth temperature optimum of less than 15°C. Mesophilic organisms are those that live in normal environments (up to 40°C). Thermophilic organisms have a growth temperature optimum of greater than 50°C. Proteins from these three different classes of organisms have different properties that help them remain stable within their respective temperature ranges. There has not been confirmable evidence which shows which protein features determine thermostability. Luciferases are enzymes that produce light. Using Directed Evolution, mutating genes using error prone PCR and applying a selection, luciferase genes from a psychrophilic organism will be mutated using the method of error prone PCR. The purpose of this research is to select for mutations of the amino acid structure that promote thermostability at higher temperatures. First, a high temperature expression system must be found for expressing plasmids containing mutated enzyme genes. A strain of *Thermus thermophilus* has been determined for use as a high temperature expression system for the mutated

genes. A shuttle vector (plasmid) will be determined and constructed for expression in mesophilic (*E. coli*) and thermophilic organisms (*T. thermophilus*). The ideal growth medium and growth conditions will be determined for *T. thermophilus* using growth curves. A procedure will be determined to create competent *T. thermophilus* cells with optimum transformation efficiency. The competent cells will be used to express the mutated genes of the psychrophilic luciferase from the directed evolution. These resulting genes, which are stable at mesophilic and thermophilic temperature ranges, will be analyzed for their structural differences contributing to thermostability. The mutated genes will be used to create a library of thermo-stabilizing mutations which will be compared to a database of extant mesophilic and thermophilic proteins from the same enzyme family. The genes will be analyzed for the amino acid structure mutations. The analysis of the mutations will give insight into which amino acid changes in the polypeptides give rise to the different thermo stabilities of the mutated enzymes. This analysis will allow scientists to see whether patterns of adaptation are dependent on protein fold. These mutations may one day give insight into the mechanism of protein folding.

A LONGITUDINAL STUDY OF FOLLICLE STIMULATING HORMONE EXPRESSION IN PREPUBERTAL 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 FSH mRNA expression begins. Gene expression was determined for the FSH beta subunit in five-, ten-, fifteen-, and twenty-day-old mice. The FSH beta subunit was expressed in all age groups thus indicating that FSH expression begins very early in development. However, despite the expression of mRNA, morphological studies do not reflect an active form of FSH is initiating gonad development, hormone production, or gametogenesis. Early expression of FSH may be critical to establish a hormonal milieu that leads to maturation of the gonads.

IMMUNOLocalIZATION OF ZONULA OCCLUDENS-1 (ZO-1) IN MCF-7 CELLS FOLLOWING TREATMENT WITH 17-ESTRADIOL AND TAMOXIFEN

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The purpose of the research project was to study the expression of ZO-1 in human breast cancer MCF-7 cells following treatment with estrogen and anti-estrogen. Zonula occludens-1 is a tight junction (TJ) protein that is located on cytoplasmic membrane surface precisely at sites of cell-cell contact. TJ are present in the luminal surface of epithelia where it creates an intercellular barrier by limiting ability of solutes, water and immune cells to travel paracellular space. Thus the passage of material is controlled since they can only pass through the cell membrane. Using indirect immunofluorescence microscopy, we have investigated cellular localization of ZO-1 in MCF-7 cells following treatment with 17b-estradiol and tamoxifen. Since tamoxifen mimics the action of 17-

estradiol and also acts as an anti-estrogen, the current study was undertaken to test the effects of tamoxifen and estradiol on human breast cancer MCF-7 cell line. Cells were grown for two days on square 22 x 22 mm coverglasses and treated with 0.1% BSA, 0.01% DMSO, 10^{-6} M 17 β -estradiol, and 10^{-6} M tamoxifen. After 48h cells were washed in Dulbecco's phosphate buffered saline (DPBS), pH 7.4, and were fixed in cold methanol for 10 minutes. Rabbit anti- ZO-1 polyclonal primary antibody (2.5 μ g/ml) was added to all cells except the negative control. These cells incubated for one hour at room temperature before they were washed three times in DPBS. Next, all cells were placed in Alexa-Fluor 488 goat anti-rabbit secondary antibody (4 μ g/ml) for 30 minutes. The stained cells were then washed twice with DPBS and mounted with Prolong antifade mounting medium and viewed under a Zeiss fluorescence microscope. We have observed a strong and intense staining for ZO-1 at the position of tight junctions in control cells. With 10^{-6} M 17 β -estradiol treatment MCF-7 cells have relatively increased numbers and stronger staining pattern in the TJ loci. However, with 10^{-6} M tamoxifen treatment the staining was reduced. This suggests that the anti-estrogenic effect of tamoxifen may be mediated by down regulating ZO-1 protein. * Supported by NIH Grants GM068627, HD38342 and MD00233

CHARACTERIZATION OF THE MANGANESE-OXIDIZING PROTEIN FROM *LEPTOTHRIX DISCOPHORA*

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A diverse number of microorganisms have the capability to precipitate, adsorb, or accumulate metals from their environment. Such organisms could be used to recover trace precious metals, to absorb toxic metals from waste, or to catalyze surface reactions. One such wetlands organism, *Leptothrix discophora*, deposits manganese (Mn) oxides into an extracellular sheath. The gene sequence of its Mn-oxidizing protein indicates a similarity to multi-copper enzymes that mediate a variety of substrate oxidations. Very little is known about the chemical mechanism of manganese oxidation due to the inadequate amounts of protein available by isolation from the native organism. We are trapping active protein in a non-denaturing gel and staining for manganese oxidizing activity. Gel slices will then be electroeluted to isolate active protein or be used directly for spectroscopic measurements.

DIFFERENTIAL EXPRESSION OF ZINC TRANSPORTER 1 (HZIP1) IN NORMAL AND MALIGNANT PROSTATE TISSUES FROM AFRICAN AMERICANS AND EUROPEAN AMERICANS

Maureen Watson and Omar Bagasra
Dept. of Biology, Claflin University

The peripheral zone is the major region of the human prostate gland where malignancy develops. The normal peripheral zone glandular epithelium has the unique function of accumulating high levels of zinc. In contrast, the ability to accumulate zinc is lost in the malignant cells. This lost ability of the neoplastic epithelial cells to accumulate zinc is a consistent factor in their development of malignancy. Recent studies identified ZIP1 (SLC39A1) as an important zinc transporter involved in zinc accumulation in prostate cells. Furthermore, incidence rates for prostate cancer are higher in African Americans (AAs) than in European Americans (EAs). Our laboratory is attempting to decipher the interaction of environmental and genetic factors that result in the development of prostate cancer in AAs. We hypothesize that since Africa is a mineral-rich continent, and the zinc

levels in the water and diet are high, Africans may have genetically downregulated their zinc transporters. It is therefore possible that African descents living in low-zinc areas (i.e. North America, Jamaica, etc) may absorb low zinc when compared with other racial groups because of their inherent downregulation of zinc transporters. Therefore, we investigated the possibility that the down-regulation of hZIP1 gene expression might be involved in the inability of malignant prostate cells to accumulate zinc and have compared the relative zinc uptake and as well gene expressions in 19 pairs of age-matched, Gleason-Score-matched prostate tissues from AAs vs. EAs. Results: 1) hZIP1 gene expression was markedly down-regulated and zinc was depleted in adenocarcinomatous glands and in prostate intra-epithelial neoplastic foci (PIN). These changes occur early in malignancy and are sustained during its progression in the peripheral zone. 2) As compared to EAs the paired tissues from AAs exhibited a significant down-regulation of hZIP1 and a lower accumulation of zinc ($p > 0.01$). Conclusion: The studies demonstrate that hZIP1 gene expression is down regulated and zinc is depleted in adenocarcinomatous glands and that AAs as compared to EAs accumulate zinc at much lower levels and this appears to be the due to the down-regulation of hZIP1 transporters. These observations lead to the plausible proposal that down regulation of hZIP1 is a critical early event in the development of prostate cancer and most likely plays a more significant role in AAs as compared to EAs.

TRANSPORTATION FIRM MERGERS IN THE NORTH AMERICAN FREE TRADE AREA

Clinton Whitehurst
Clemson University

Although criticized, and sometimes justly, the North American Free Trade Area (NAFTA) is here to stay. Granting that, it is then to the advantage of the three partners to make NAFTA as economically viable and competitive as possible. In this context, the importance of transportation, the glue that physically ties together a geographic area of 8,152,755 square miles, cannot be overstated. In this respect, two undertakings are important. One is to continually encourage improvements in transportation technology and innovation. The second is to make management of NAFTA's transportation system as efficient as possible. Research here concentrates on the latter; specifically examining possible transportation mergers within NAFTA; both intra-modal and inter-modal. Three assumptions are made.(1)Without the active support and encouragement of the governments of the U.S., Canada, and Mexico, no mergers of any consequence will occur. (2)In terms of ownership, the merged systems must remain in the private sector.(3) The degree of competition prior to mergers must be essentially the same as after mergers. Concluded is that globalization of transportation is only a matter of time. NAFA can be the model for this future.

END

South Carolina Academy of Science
2008 Meeting Abstracts

South Carolina Academy of Science Annual Reports

This section typically contains the following reports:

- * Report of the President / 2009 annual meeting
 - * Report of the Secretary
 - * Report of the Treasurer
 - * Report of the SCJAS Treasurer
 - SCAS Legislative Funds
- * Undergraduate Research Awards Committee
 - SCAS Two Year College Committee
 - AAAS Student Research Grants
 - NAAS/AJAS Delegate Report
 - * MESAS
 - MESAS Financial Reports
 - * Science & Engineering Fairs
 - * DCYSC
- * Certified Metrication Specialist Program
- * South Carolina Academy of Science Manual of Procedures
(Amended April 20, 2007)

* Denotes a report included in this section.
Reports lacking a * indicate a report not received in time
for inclusion in the 2008 Bulletin

President's Report

Thomas Reeves, President

February 14, 2008

I am pleased to report that the South Carolina Academy of Science has had another successful year.

The Eightieth Annual Meeting of the South Carolina Academy of Science (SCAS) was held in conjunction with the South Carolina Junior Academy of Science (SCJAS) on Friday, April 20, 2007 at the Airport Campus of Midlands Technical College in Columbia, SC. More than 300 research papers and posters were presented throughout the day in twelve topical sessions. This is only the second time that the annual meeting has been held at one of the technical colleges in our state.

An interesting array of invited speakers were featured. The keynote presentation was given by **Dr. Michele Dominick Bishop**, an Assistant Professor of Medicine at the Mayo Medical School in Jacksonville, Florida and a nationally recognized expert in gastroenterology and hepatology who specializes in pancreatic diseases. **Dr. Bassam Shakhshiri**, a Professor of Chemistry at the University of Wisconsin-Madison and former chief education officer at the National Science Foundation presented *Science and Scientific Literacy* illustrating how complicated chemical processes can be explained through many of the fascinating chemical demonstrations that he had developed over the years. **Mr. Howard Burnham** a gifted scholar and actor presented *On the Shoulders of Giants* in which he portrayed five famous scientists whose vision and research changed the course of human history including Aristotle, Louis Pasteur, Sir Isaac Newton and Albert Einstein.

The 2007 SCAS Annual Meeting was an enormous success with more than 500 individuals attending the event. As the President of the South Carolina Academy of Science, I want to encourage you to support this important volunteer organization. No other professional group in the state supports and encourages scientific research and science awareness in the manner of the SCAS with our numerous activities throughout all levels of our educational system. At no point in human history has science and technology been expected to find solutions for problems as great as global warming or alternative energy sources. At no point has science and technology had greater resources to deal with these challenges. The SCAS plays a critical role in integrating the activities of research scientists from throughout the state with the activities of business and industry, as well as, recognizing the state's most effective science teachers and programs. Your support and membership in SCAS plays a crucial role in continuing the effective work that for so long has been characteristic of this organization.

This year our annual meeting will be held at Clemson University on March 20, 2008. Our President-Elect Dr. Dave Gangemi will be coordinating the event. In addition to the usual program, Dave is planning a number of new activities to encourage greater participation by undergraduate students and high school teachers from throughout the state. I have enjoyed working with Dave over the past year, and I can tell you that the SCAS annual meeting could not be in better hands.

For more information pertaining to the SCAS, please do not hesitate to contact me at reevest@midlandstech.edu or telephone 803-822-3554. It has been an honor to serve as president of the SCAS. I look forward to seeing you at the annual meeting and working with you in the upcoming year.

Sincerely,

Tom Reeves
President, South Carolina Academy of Science

Report of the Secretary

South Carolina Academy of Science

Council Meeting

Minutes of Meeting held February 2, 2007 at USC Columbia,
Room 101 Graduate Science Research Center

President Hans-Conrad zur Loye called the meeting to order at 2:37 PM. Present: Hans-Conrad zur Loye, Jim Privett, Dave Gangemi, Dave Stroup, Tom Reeves, John Safko, Jane Ellis, Peter Fichte, George Shiflet, Alvin Fox, Dave Ferris, Bill Pirkle, Sharon Gilman, Don Jordan, Karin Beaty, Dan Antion (Guest), Anthony Kurlychek.

Hans zur Loye welcomed everyone. Minutes of the September 29, 2006 meeting were presented. Motion was made by John Safko for approval, seconded by George Shiflet and passed as read.

Reports from Officers

President

Dr. zur Loye stated that he plans to submit an editorial to the State Paper on global warming and sign it as President of SCAS. He will send an advance copy to council members for approval. He plans to nominate John Safko for another three-year term as Treasurer. We need to consider a good replacement for him and allow enough time for this person to shadow John. Karen Fox has requested we think of a replacement for her position as Executive Director of SCJAS. Tom Reeves noted the replacement for this position would also need a period of "shadowing". Dr. zur Loye would like to expand the SCAS Journal. A request was made to include a "call for papers" on the second page of every SCAS Newsletter.

Immediate Past President

Jim Privett mentioned Peter Fichte would be retiring as SCJAS Judging Coordinator at the end of the year. The organization is looking for someone to replace him. Dr. Privett is working with Dave Stroup to secure nominations for council. At this time there are six nominees to fill four places. These nominees are: Lucia Pirisi-Creek (USC), Radman Ali (Morris College), Chin Fu Chen (Clemson), Briana Timmerman (USC), Austin Hitt (Coastal Carolina), and Chasta Parker (Winthrop). They are continuing a search for a Vice Presidential nominee.

Past President

Dave reported for Tom Roop on the Teacher of the Year Award. Dr. Roop is willing to stay as chair of this committee. A discussion ensued concerning the makeup of the committee. Dave stated that he would like to be added to the committee. This was approved.

President Elect

Tom Reeves gave out material and discussed the tentative schedule and plans for the 2007 Annual Meeting to be held at Midlands Technical College Airport Campus. He will meet with certain council members to finalize the schedule of events, speakers, judging, funding, and publicity.

Vice President

David Gangemi began a discussion on the timing, location options, speakers, and funding for the 2008 Annual Meeting. Dr. zur Loye noted that we would have the new Governor's Awardee Symposium at this meeting.

Secretary

Dr. Ellis passed around a copy of the latest List of Councilors and Officers for corrections. Copies of the list were given out to all who wanted them.

Treasurer

Dr. Safko distributed a treasurer's report showing that we have a total of \$120,138.35. \$16,493.39 of this total is the AOP Regional Science Fair's money. Dues and money for the Annual Meeting are starting to come in. A complete Treasurer's Report will be in the Bulletin. Dr. Safko, Don Jordan and 5 students will be attending the AAAS Meeting in San Francisco this month.

Reports from Standing Committees

Bulletin Advisory Committee

Dr. Ferris provided a list of items needed for the Bulletin. The cost of printing each Bulletin has gone up from \$7.50 to \$10.00. In the past 700 copies have been printed. This year we will print only 650.

Governor's Award

Dr. Jordan presented a copy of next year's nomination form for the Governor's Awards. He announced this year's winners: Dan Err, Stacy Jones, Dr. Barr. This year each person nominated will receive a certificate signed by the governor.

High School Research Awards

Anthony Kurlychek reported for Karen Fox. Again this year SCJAS has received \$1000 from AAAS for the award winners.

Long Range Planning

See President's report above.

Necrology

President zur Loye received a letter stating Dr. John Freeman had died. Jane Ellis will acknowledge receipt of this communication. zur Loye plans to appoint Karin Beaty as chair of the Necrology Committee.

Membership Committee

John Safko mentioned that the number of members will increase as abstracts and registration materials for the Annual Meeting start coming in. He mailed 131 issues of the winter newsletter. Some were also sent via email. He noted that dues notices go out by first class mail and any that have the wrong address are returned.

Patron Membership

Dr. Stroup and President zur Loye will cross check the Patron's list and send out letters.

Newsletter

Mike Farmer was not present. No report given.

Nominations and Elections

See Immediate Vice President's report above.

Science Fairs/NAAS Representatives

Tina Webb was not present. Don Jordan stated that Lancaster wants to form a new science fair region that will take in Chesterfield and Chester Counties. Dave Stroup and Don will contact the science fair regions involved and discuss this option. A motion was made by John Safko and seconded by Peter Fichte to approve this new region proceeding with its plans to form a new science fair region. The motion passed.

Publicity

John Inman was not present. No report given.

Secondary Science/Mathematics Teacher of the Year

See the Past President's report above.

Undergraduate Research Awards

Bill Pirkle described the four sets of undergraduate research awards. These are the Sigma Xi and SCAS Jointly Sponsored Research Paper and Poster Awards, Explorers Club or "Frontier of Science" Awards, Invertebrate Award, and the AAAS Award.

Other Reports

SCJAS

Karen Fox was not present. Anthony Kurlychek reported for Dr. Fox stating that the SCJAS Winter Workshop had to be cancelled. If anyone knows of a campus willing to hold SCJAS workshops please let Karen or Anthony know. The SCJAS Fall Workshop was held at Erskine College on November 11.

MESAS

Don Jordan passed out copies of this year's MESAS Contest and discussed the record numbers of schools and students participating. Also, he passed out a summary of the evaluations for the Benedict College Midlands MESAS Workshop held on November 11. Benedict College's Workshop had 33 sessions and an attendance of 785.

Old Business

None.

New Business

Anthony Kurlychek would like to purchase some banners for SCAS exhibits. President zur Loye asked Kurlychek to look into costs and types of banners. Council approved the purchase of banners for promoting SCAS at meetings and exhibits.

Good of the Order

None

Meeting adjourned at 5:15 PM.

Respectfully submitted, Jane P. Ellis

South Carolina Academy of Science
Council Meeting
Minutes of Meeting held April 19, 2007
Midland's Tech Airport Campus, Columbia, SC
Executive Conference Room, Academic Center

President Hans-Conrad zur Loye called the meeting to order at 8:08 PM. Present: Hans-Conrad zur Loye, Jim Privett, Dave Gangemi, Tom Reeves, John Safko, Jane Ellis, Karen Fox, Alvin Fox, Karin Beaty, Bill Pirkle, Sharon Gilman, Don Jordan, Val Dunham, Ali Radman, Linda Sinclair, Dwight Camper, Bill Mahoney (guest), Anthony Kurlychek.

Reports from Officers

President

Dr. zur Loye gave special thanks to Tom Reeves and Midlands Tech for hosting the Annual Meeting. Minutes of the February 2, 2007 meeting were presented and approved as read. Council was requested to look at the categories of membership and email him with ideas if anyone feels changes need to be made. Karen stated she needs some help with the workshops. The SCJAS judging coordinator is retiring this year. Jim Privett has volunteered to take this position. A motion was made by Karen that Jim Privett be appointed new SCJAS judging coordinator. Peter Fox seconded and the motion passed.

Immediate Past President

Dr. Privett announced the election of Lucia Pirisi-Creek (USC), Radman Ali (Morris College), Briana Timmerman (USC), and Chasta Parker (Winthrop) to council. Sandra Runyon from College of Charleston was elected vice-president.

Past President - David Stroup was not present.

President Elect

Tom Reeves gave out the schedule and discussed the meeting plans. He introduced Bill Mahoney from SCRA, a sponsor of the Annual Meeting this year.

Vice President

David Gangemi discussed the date and location options at Clemson for the 2008 Annual Meeting.

Secretary

Dr. Ellis passed around a copy of the latest List of Councilors and Officers for corrections. Copies of the list were given out to all who wanted them.

Treasurer

Dr. Safko distributed a treasurer's report showing that we have a total of \$94,468.71. \$16,493.39 of this total is the AOP Regional Science Fair's money. He stated there was a new membership application form. We need new members. We have received grant money from the two Sigma Xi Chapters and \$1000 from AAAS. SCAS has a new patron member. John passed around the list of new members.

Reports from Standing Committees

Bulletin Advisory Committee- Dr. Ferris was absent.

Governor's Award - No report was given.

Necrology - No report was given.

Membership Committee - No report was given.

Patron Membership

Dave Stroup was not present but zur Loye noted that Dave has been contacting a number of people and sending out letters to increase Patron Memberships.

Newsletter- Mike Farmer was not present. No report given.

Nominations and Elections - See Immediate Vice President's report above.

Science Fairs/NAAS Representatives

Don Jordan announced that 26 students would be representing South Carolina this year at ISEF along with 14 parents and 5 sponsors. They will be leaving on May 13. The State Legislature is trying to arrange for all these students to be presented to the SC Assembly. South Carolina will have a large state flag to use in the ISEF parade in Albuquerque, NM this year.

Publicity

John Inman was not present. No report given.

Secondary Science/Mathematics Teacher of the Year

Tom Roop was not here. No report given.

Undergraduate Research Awards

Bill Pirkle stated that there are 82 undergraduate presentations with 69 of these oral and 13 posters. There are nine oral sessions and one poster session. Eighteen institutions will be represented and nineteen judges have volunteered to judge the undergraduate sessions.

Other Reports

SCJAS

Karen Fox reported that there are 177 SCJAS oral presentations this year and this number is up from the 135 last year. There have been some problems getting judges this year. We have the largest group of middle school students ever involved. There was no winter workshop this year but one is planned for winter 2008. The fall workshop will be at Converse College. Karen is trying to do the fall workshops at colleges or universities and winter workshops at high schools. This seems to work well.

MESAS

Don Jordan will be on sabbatical in the fall and Anthony will be working with MESAS. Newberry College is considering having the fall workshop. Over 800 students participated in the MESAS contest this year. They are looking for someone to write the contest for this coming year.

Science Development

Val Dunham had no report.

Old Business

None.

New Business

Linda Sinclair has the Governor's Proclamation for Science and Mathematics Week. She publicizes information statewide about this week from her office. Science and Mathematics Week always coincides with the SCAS Annual Meeting. She also noted that Michelle Sutton would be awarded the SCAS Teacher of the Year Award tomorrow.

Good of the Order

None

Meeting adjourned at 9:25 PM.

Respectfully submitted,

Jane P. Ellis

South Carolina Academy of Science Business Meeting

Minutes of Meeting held April 20, 2007 in Room 102 Academic Center Midland's Tech, Airport Campus, Columbia, SC

The meeting was opened by President Hans-Conrad zur Loye at 5:00 PM. Minutes of the March 10, 2006 Business Meeting were presented and accepted as read.

Report from the President – President zur Loye thanked Tom Reeves for organizing the 2007 Annual Meeting and Midland's Tech for hosting the event. There were 82 undergraduate presentations with 69 of these oral and 13 posters. He also thanked all attendees, judges and presenters for their participation. He announced that next year's Annual Meeting would be held at Clemson University. The date is still being finalized.

Report from the Treasurer – John Safko reported SCAS has \$94,468.71 on hand. The Annual Meeting income is \$1,827.00 to date and with 232 registered. Other information can be found on the Finance Report.

Old Business – None

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

ARTICLE X. MIDLANDS REGIONAL SCIENCE FAIR

Section 1.

The South Carolina Academy of Science Midlands Science Fair, also known as the Region II Science and Engineering Fair shall be a subsidiary organization of the Academy. The Academy shall assist the Midlands Regional Science Fair by providing financial oversight to aid it to provide a regional science fair to encourage an interest in science and engineering among students that region of South Carolina.

Section 2.

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

Section 3.

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

Current Article X becomes Article XI

John Safko also discussed some problems with online registration and bulletins arriving in time to members for the Annual Meeting. A motion was made to have the schedule of the Annual Meeting published online as soon as possible and to continue printing the bulletin as it has been in the past. Motion was seconded by Gangemi and passed by members present.

Meeting was adjourned at 5:50 PM.

South Carolina Academy of Science Council Meeting

Minutes of Meeting held July 27, 2007 at USC Columbia,
Room 101 Graduate Science Research Center

President Hans-Conrad zur Loye called the meeting to order at 2:45 PM. Present: Hans-Conrad zur Loye, John Safko, Tom Reeves, Lucia Pirisi-Creek, Karin Beaty, James Privett, David Ferris, Dave Gangemi, Karen Fox, Chasta Parker, Alvin Fox, Tom Falvey, & Anthony Kurlychek.

Hans zur Loye welcomed everyone. Minutes of the April 19, 2007 meeting were presented. Motion was made for approval and seconded. Motion was passed to accept minutes as read.

Reports from Officers

President

Dr. zur Loye mentioned the annual meeting went well. He discussed details of the SCAS Journal meeting held earlier in the day between him, Drs. Alvin Fox, Dunham and Ferris. Dr. Ferris will be editor in chief of the Journal with 4 section editors consisting of Dr. Fox, Dr. Dunham, Dr. zur Loye and a 4th to be determined for science education. A request for nominees was made. There will be 4 issues per year of the journal.

The SCAS is going through a deficit at present time. Dr. zur Loye requests asking the state government for more funding at this time since there is a state budget surplus. Alternatives are fund-raising from corporate or member donors. Dr. Pirisi-Creek suggested getting dues-paying services running on the SCAS web site and increasing the fees slightly to help make it easier for people to join.

Immediate Past President

Jim Privett introduced Chasta Parker of Winthrop University as a new member of the SCAS Council.

Past President - Dave Stroup was not present.

President Elect

Tom Reeves will meet with Bill Mahoney of the SC research Authority to discuss funding of the Academy by SCRA.

Vice President

David Gangemi confirmed the date of the 2008 Annual Meeting for Thursday, March 20, 2008 at the Hendrix Center at Clemson University. This will be Clemson's spring break week.

Having a theme for the event was discussed. A theme favored by Dr. Gangemi and council was climate change. Plans for speakers and demonstrations by various persons centered on the theme are being pursued.

Buildings used for the annual meeting are all close to the Hendrix Center and are all reserved and ready.

Secretary

Dr. Ellis was not present. Anthony Kurlychek passed around a copy of the SCAS Council list for updates.

Treasurer

Dr. Safko passed out a budget for 2007-08. There are expenses due the Academy from the Governor's Award sponsors for the 2007 Award, and expenses due for fees rendered to ISEF students. The SCAS has a deficit of \$17,000, but taking into account the aforementioned and the like, we are only in debt \$6129.

Dr. Safko discussed a list of responsibilities the SCAS treasurer must face and reminded Council a replacement treasurer will be needed in the future.

A discussion of raising fees arose and a motion was made to do so by Karen Fox. I did not hear who seconded, but motion was passed. SCAS dues and fees are now as follows – Regular member = \$35; students = \$15; joint membership = \$50; Contributing members = \$50; and supporting members = \$100 and above.

A motion was made to approve the budget. Seconded by Karen Fox and passed.

Reports from Standing Committees

Bulletin Advisory Committee

It was decided the deadline for the program would be March 3, 2008 and the deadline for abstract submission will be Feb. 15, 2008. It was also decided that Bulletins would not be mandatory to have on hand at the time of the Annual Meeting.

Governor's Award

Dr. Jordan was not present. Anthony Kurlychek mentioned the request for funds by the Award sponsors was submitted to the respective Sponsors. Also, nomination forms for the 2008 Winners will be posted online soon.

Membership Committee - No report given.

Nominations and Elections - No report given.

Publicity - John Inman was not present. No report given.

Undergraduate Research Awards

Bill Pirkle was not present. Dr. Karen Fox will talk to Dave Slimmer about the High School Research Awards. Creating a Sigma Xi chapter at USC was also discussed.

SCJAS

Karen Fox discussed the meeting between herself, Drs. Fichte, Privett and Anthony Kurlychek concerning the SCJAS annual meeting and what improvements can be made.

The SCJAS winter workshop will be held at AC Flora high school and the Fall workshop will be at Converse College (since changed as of the time of this recording).

The SCJAS broke even financially for the 2007 annual meeting.

MESAS

Don Jordan was not present. Anthony Kurlychek discussed the upcoming Fall workshop at Newberry College. Discussion ensued concerning other MESAS regions whereby it was reported by Anthony Kurlychek that no other regions are currently active in workshops and the like at this time, but we are trying to find people able to get things moving again.

Mr. Kurlychek also mentioned his attempts at finding volunteers to help create the questions for the 2008 MESAS Contest. One school has turned him down and another has not responded. He requested council to please help.

Science Development - Val Dunham was not present. No report given.

Science Fairs/NAAS Representatives

Don Jordan was not present. Anthony Kurlychek reported the 2007 ISEF winners from the Midlands. It was also mentioned the 2008 Region II Science fair would be at the State Fairgrounds. Once again, discussion ensued in regards to information concerning all regions, which Mr. Kurlychek was not privy to at this meeting.

Dr. Saffko requested a report concerning all science fair regions for future meetings.

A motion (unknown) was made for committee chairs to submit their respective reports in writing prior to the Council meetings if they will not be present. Dr. zur Loye seconded and motion was passed.

Old Business

None.

New Business

Discussion of retaining the services of Anthony Kurlychek as Administrative Assistant for the Academy. It was decided more information was needed by council. Council would like to agree to terms, but must research financial options to do so.

Dr. Karen Fox discussed ways of giving students instructions on how to give a good presentation at the annual meeting.

Good of the Order

Dr. Hans-Conrad zur Loye handed over the presidency officially to Dr. Tom Reeves.

Meeting adjourned at 4:33 PM.

Respectfully submitted,
Anthony Kurlychek, Jr.

South Carolina Academy of Science
Council Meeting
Minutes of Meeting held October 5, 2007
McCutchen House, University of South Carolina

President Tom Reeves called the meeting to order at 2:45 PM. Present: Tom Reeves, Hans-Conrad zur Loye, John Safko, Jane Ellis, Karen Fox, Karin Beaty, James Privett, Dave Stroup, Dave Gangemi, Don Jordan, Bill Pirkle, Alvin Fox, Tom Falvey, Anthony Kurlychek.

Tom Reeves welcomed everyone. Minutes of the July 27, 2007 meeting were presented. Motion was made for approval and seconded. Motion was passed to accept minutes as read.

Reports from Officers

President

Dr. Reeves passed out copies of the latest newsletter. This year, to save money, we will have three newsletters instead of four. The next newsletter will have the Annual Meeting's call for papers. It will be in the mail by January 15.

Immediate Past President

Dr. zur Loye asked council for help in recruiting new SCAS members. He and Karen Fox will work together to develop a flyer describing the benefits of being a member of SCAS. If council has any ideas on this matter please send him an email.

Past President - Dr. Privett had no report.

President Elect

Dr. Gangemi noted that the 2008 Annual Meeting would be held on Thursday, March 20, 2008 in the Hendrix Center at Clemson University. All necessary rooms have been reserved. Rooms at the local Comfort Inn have been reserved for those who need to spend the night. Global Warming will be the meeting theme. Anthony will need to know the abstract due dates for the website and newsletter. Dave thanked Tom Reeves for his help and advice in planning the Annual Meeting.

Vice President - Dr. Runyon was not present.

Secretary

Dr. Ellis passed around the officers and council list for corrections.

Treasurer

Dr. Safko reported a balance of \$116,523.58. He noted the International Science Fair would cost less this year since it will be held in Atlanta. At the present we have a core membership of 26 teachers, 153 regular, 24 joint, 10 emeriti, and 1 contributing. We need to increase our patron membership and paid membership. Don Jordan described John Safko's many contributions to SCAS. President Reeves noted one the goals in the Five Year Plan was getting help for Dr. Safko. Karin Beaty and her husband, Vernon, have offered to assist John. Dr. Safko needs another signature on accounts. Dr. Beaty can be that person.

Reports from Standing Committees

Bulletin Advisory Committee

Dave Ferris was not present but sent his report. The Journal has a new focus. It will maintain its on-line format, with four issues per year. The new section editors are: Alvin Fox – Science Policy and Communication; Val Dunham – Research in South Carolina; Hans-Conrad zur Loye – Governors (SCAS) Award Special Issue; and Tom Reeves – Science Education. A discussion ensued on which articles should be placed in each issue. The Bulletin will not be mailed before the Annual Meeting this year but will be available on-line. It will be mailed around the time of the Annual Meeting.

Governor's Award

Dr. Jordan passed around pictures taken at the SCAS Governors' Award ceremony. On September 7, nomination information for this year was mailed. The nominations are due on December 7. On January 18, 2008, the committee will meet to select the 2008 winners.

Membership Committee

With approval of council Dr. Reeves would like to change the name of this committee to Finance and Membership. He will be temporary chair and has asked Dr. Gangemi and Dr. Stroup to work with him. See Dr. Safko and Dr. zur Loye's report for information on membership.

Nominations and Elections

Dr. zur Loye asked council for nomination suggestions for next year to fill vacancies in council, and positions of secretary and vice president. Dave Stroup will be filling out the term of Councilor Peter Fichte who has retired. Dr. Fichte's term ends in June 2008.

Publicity

John Inman was not present. Dr. Reeves will contact Dr. Inman.

Secondary Science/Mathematics Teacher of the Year

Anthony Kurlychek has mailed letters asking for TOY nominations. Tom Roop's letter states that nominations are due on December 14, 2007.

Undergraduate Research Awards

Bill Pirkle reported that Charleston's Sigma Xi chapter invited all 2007 undergraduate award winners to their banquet and Dr. Pirkle was able to present the awards at this time. Since the Annual Meeting was late this year, Clemson's chapter had already had their banquet and could not honor the upstate award winners. The criteria used in judging is posted on the website. This year approximately 100 presentations were judged.

SCJAS

Karen Fox reported that the SCJAS winter workshop would be held at AC Flora High School. The fall workshop will be at USC Upstate on October 20. The Archaeology Society of SC is willing to support a research award for a deserving high school student in the field of archaeology. Dr. Fox is asking for ideas on how SCJAS can implement this award.

MESAS

Dr. Jordan reported that the MESAS Workshop was held at Newberry College last weekend with approximately 800 people in attendance. The MESAS contest has been very popular and the SC² President and Linda Sinclair are working on the contest for this year. Dr. Jordan is planning to have the MESAS workshop at USC next fall.

Science Development

Val Dunham was not present. No report given.

Science Fairs/NAAS Representatives

Don Jordan reported that South Carolina had two winners at the International Science Fair from Region II and there were winners from other SC regions. SC had 9 semifinalists out of 7,000 in the Discovery Channel Young Scientist Challenge with one of these named a finalist. Next week is Metric Week. 2200 Metric Proclamations were mailed around the state. South Carolina now has 106 Certified Metric Specialists. The Long Range Planning Committee recommended giving \$2000 to assist Region VI Science Fair in their affiliation with ISEF this year. Council approved. Anthony Kurlychek has graduated from USC with Honors. Long Range Planning has recommended that his compensation be increased from \$24,000 to \$31,000. Council approved. Dr. Jordan commended Mr. Kurlychek for the excellent job he has done for the Academy. Council discussed the possibility of adding Bill Mahoney, a representative of South Carolina Research Authority, and Scott Little, State Manager of SC EPSCoR, as ex-officio members of SCAS council. It was agreed to give them a standing invitation to attend council meetings and table further discussion.

Old Business

None.

New Business

Anthony Kurlychek noted that MESAS needs directors in three areas of South Carolina. Karin Beaty reported for Necrology that a message was received from Tina Webb-Browning concerning the death of Stephen H. "Wito" Witowich, Jr. He died August 20, 2007. Tom Falvey announced a new position at the SC State Museum in the area of Science and Astronomy.

Good of the Order

None.

Meeting adjourned at 3:32PM.

Respectfully submitted,

Jane P. Ellis

SCAS Treasurer's Report
John Safko, Treasurer

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.

SCAS Financial Report 9/10/07

Assets on Hand

Checking	\$11,366.16
Money Market	\$10,450.44
Deposit for last year	\$1526.50
<u>Postage fund</u>	<u>\$284.31</u>
TOTAL	\$22,100.99

Debits outstanding

Office for August and September: ~ \$16,000

Outstanding Credits

2 patrons support for SCAS-Gov Award for outstanding Science ~ \$3,000
State grant for year \$100,000

Currently I am the only authorized signature on our accounts. Council must decide who else should be added and what time restrictions are necessary.

These signatures will only be honored by the bank in case I am not available or become not available. By this, I mean that the Bank will check with me before accepting deposits/withdrawals on these signatures. They will honor the signatures if I agree or if they find that I cannot physically agree.

They require copies of minutes of a board meeting where the signatures are approved by the board.

Category Summary Report

8/1/06 through 2/1/07

Category	8/1/06- 2/1/07
pay:	
post Doc	4,134.00
PT student	4,379.98
under grad	2,622.05
	<hr/>
Total pay	11,136.03
Salary - Other	13,586.01
	<hr/>
Total Salary	30,873.43
Travel	20.25
Unknown charge for balance	-0.60
	<hr/>
Total Office-Gen	38,766.54
Office-Treas:	
banking fee	5.00
prep & postage	377.67
supplies	151.67
travel	3.40
Office-Treas - Other	0.00
	<hr/>
Total Office-Treas	537.74
prep & postage	85.00
Publicity	13.53
Scj-re-aw-E	789.12
SCJAS-AJAS	8,794.03
Scjas-E-post	100.00
Scjas-E-Print:	
workshop printing	132.50
Scjas-E-Print - Other	1,363.86
	<hr/>

Total Scjas-E-Print	1,496.36
SCJAS-Expenses	120.00
SF - Region II	60.00
To Postage	3,000.00
Total Outflows	56,824.09
Net Inflows/Outflows	55,967.54

Inflows

Bulletin-I	41.00
Donations	10.00
Dues05-06	824.00
Dues06-07	3,163.00
Interest	88.57
ISEF-I(06)	7,581.87
MESAS Region IV-I	975.31
NAAS-I	282.88
StateGrant	99,825.00

Total Inflows **112,791.63**

Outflows

Bulletin-E	13.00
Council-E	11.01
Gaes-E	100.00
MESAS-E:	
announcement,supplies	1,289.80
Awards-contest	143.00
prep & postage	220.00

Total MESAS-E 1,652.80

metcer-week:	
other expenses(printing)	868.96
prep and postage	150.00

Total metcer-week 1,018.96
NAAS-E 266.00

Office-Gen:	
equipment	6.60
General operations	3,754.12
Office supplies	2,323.92
phone	347.75
postage	964.29
Printing, prep, postage	346.78
rents	130.00
Salary:	
fringe	4,151.39
GA supplement:	
bonus	500.00
GA supplement - Other	1,500.00
	<hr/>
Total GA supplement	2,000.00



SOUTH CAROLINA JUNIOR ACADEMY of SCIENCE

Affiliated with the South Carolina Academy of Science

**FINANCIAL STATEMENT
August 1, 2006 - July 20, 2007**

Beginning Balance 8/1/06 (NBSC Checking Account)

\$13,691.93

Income

Interest	13.92
Membership Dues	2,106.00
Fall Workshop Registration (Erskine)	910.00
Winter Workshop (none this year)	0.00
Annual Meeting Registration (Midlands)	4,530.00

Total Income

\$ 7,559.92

Transfer of Fund from SCAS

\$10,208.00

Expenses

Supplies (postage, ink, papers)	
69.01	
Printing (SCJAS membership cards)	
89.39	
NBSC Business Checks	
141.65	
Student Travel (Board Meeting)	
280.00	
Travel Grant (Fall Workshop)	
1,030.00	
Travel grant (Annual Meeting)	
380.00	
Fall Workshop (lunch, refreshment, trophies, supplies)	
1,040.19	
Annual Meeting (lunch, pizza, printing)	
3,107.27	
Annual Meeting Monetary Awards (student research)	
10,406.00	
Total Expenses	
(\$16,543.51)	

Ending Balance as of July 15, 2007

\$ 14,916.34

Outstanding Checks

865.00

Other Income

Donation (deposited in SCJAS Trust Fund – First Citizen)	
250.00	
Trust Fund Value on June 30, 2007	
\$117,230.72	

UNDERGRADUATE RESEARCH AWARDS COMMITTEE

N. Dwight Camper, Chair

The South Carolina Academy of Science in cooperation with Charleston and Clemson Chapters of Sigma Xi recognized outstanding undergraduate research at colleges and universities within the State of South Carolina. The purpose of the awards is to foster, encourage, and recognize the work done by South Carolina undergraduate students on projects of exceptional scientific merit.

Awards were made by a panel of distinguished judges and were based on the research presented by the students at the Academy's Annual Meeting on April 20, 2007 at the Midlands Technical College in Columbia. A total of 82 undergraduate research presentations representing 18 institutions of higher education were made.

The Academy also awarded the Horace Byrne Award, sponsored by the Explorers Club of Columbia, SC, for outstanding frontier scientific research conducted by an undergraduate student and selected the recipient for the Invertebrate Biology Award, sponsored by an anonymous donor, for outstanding undergraduate research in the field of invertebrate biology.

The American Association for the Advancement of Science sponsored awards for the outstanding male and female undergraduate science students. The recipients of the AAAS awards receive a one-year honorary membership in AAAS that includes a year's subscription to *Science* magazine.

2007 OUTSTANDING UNDERGRADUATE RESEARCH AWARDS

Topical Sessions - Oral Presentations

Cell Biology

April Clayton, Department of Biological Sciences Clemson University, *Analyzing Entamoeba histolytica Cytopathic Destruction in Response to Lipoprotein-Cholesterol*

Chemistry & Biochemistry I

Gregory Goschy, Department of Chemistry and Biochemistry, College of Charleston, *Further Development of a Novel Approach to Controlling the Diastereoselectivity of the Meyers Ortho-Alkylation of Chiral Aromatic Oxazolines*

Chemistry & Biochemistry II

John Knight, Department of Chemistry and Biochemistry, College of Charleston, *Strong Base Synthesis of symmetrical Triketones*

Field Biology

Caleb McMahan, Department of Biology, Erskine College, *Geographic Variation in the Morphology of Hemidactylus bowringii in Myanmar and Yunnan, China*

Mathematics and Computer Science

Kristin Huete, Department of Computer Science and Quantitative Methods, College of Business Administration, Winthrop University, *Dead Rulers Talking*

Molecular Biology

Cari Fritz-French, Department of Biology and Geology, University of South Carolina Aiken, *Development of a Luciferase Assay for Analysis of Anti-HIV Ribozyme Activity in Tissue Culture*

Pharmacy

Heather Barton, Department of Animal and Veterinary Sciences, Clemson University, *Effects of Thaw Temperature on Murine Blastocyst Development*

Physics and Astronomy

Joseph Bramlett, Department of Physics & Astronomy, College of Charleston, *Slowly Pulsating B Stars: APT versus Mercator Results*

Public Health

Beverlee Blanchard, Department of Biology, Claflin University, *A Systematic Evaluation of HPV Vaccine Educational materials*

Poster Session

Kenneth Nesbitt, Department of Chemistry and Biochemistry, University of South Carolina, Columbia, *The Role of SufA in Fe-S Cluster Assembly*

Horace Byrne Explorers Club Award for Outstanding Frontier Science by an Undergraduate Scientist

Katherine Kramp, Department of Biology, College of Charleston, *Analysis of Projectin in Hymenoptera in the Context of Insect Flight Evolution*

Invertebrate Biology Research Award

April Clayton, Department of Biological Sciences, Clemson University, *Analyzing Entamoeba histolytica Cytopathic Destruction in Response to Lipoprotein-Cholesterol*

American Association for the Advancement of Science Award to the Outstanding Male and Female Undergraduate Scientists

Cari Fritz-French

Department of Biology and Geology, University of South Carolina Aiken

Caleb McMahan

Department of Biology, Erskine College

The Academy extends its thanks and appreciation to the 2007 Annual Meeting judges who did an outstanding job of evaluating the undergraduate presentations. The judges for the 2007 Annual Meeting were: Dr. Marjorie Aelion, University of South Carolina Columbia; Dr. Noni Bohonak, University of South Carolina Lancaster; Dr. Jim Burch, University of South Carolina Columbia; Dr. Dwight Camper, Clemson University; Dr. Val Dunham, Coastal Carolina University; Dr. Jane Ellis, Presbyterian College; Dr. Danny Faulkner, University of South Carolina Lancaster; Dr. David Ferris, University of South Carolina Upstate; Dr. Sharon Gilman, Coastal Carolina University; Dr. John Inman, Presbyterian College; Professor Elizabeth Mayo, South Carolina State University; Dr. Michael Myrick, University of South Carolina Columbia; Dr. Lucia Pirisi-Creek, University of South Carolina Columbia; Dr. Jim Privett, University of South Carolina Sumter; Dr. Ron Ruzsczyk, University of South Carolina Aiken; Dr. Gordon Sproul, University of South Carolina Beaufort; and Dr. Desuo Wang, University of South Carolina Columbia.

Middle/Elementary School Academy of Science (MESAS)

CLUB MEMBERSHIP:

Middle School Science Club membership will increase to \$5.00 per member beginning with the 2007-08 school year. 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 \$5.00. 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

ANNOUNCING

2007-2008

YOUNG RESEARCHER GRANTS-IN-AID

Sponsored by

The South Carolina Academy of Science
in conjunction with the

South Carolina Middle/Elementary Academy of Science Board

* GRANTS *

TO STUDENTS TO DO SCIENCE RESEARCH PROJECTS

MIDDLE/ELEMENTARY SCHOOL STUDENTS ARE ENCOURAGED TO APPLY

How! . . .

See Your Teacher or Contact Your Middle/
Elementary School Regional Director (see below)

When! . . .

Right Now. . . Get your proposal in!
Proposals are accepted year round.

How Much! . . .

Awards are for \$25 to \$100

Recognition! . . .

Special Certificate of Merit and statewide publicity releases

Western Region I

Paige Ouzts, Director
Physics Department
Lander University
Greenwood, SC 29649
Ph: 864-388-8277
E-mail: pouzts@lander.edu

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

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

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 20, 2008 at Clemson University).

For information contact: Dr. Don Jordan at the address/phone/fax/e-mail above, or visit <http://www.hrsm.sc.edu/jordan/> (click on MESAS).

See the list of 2007 winners on the next page!

2007 Research Award Winners

Student's Name	Project Title	School	Teacher	Amount Funded
Valentin Lazar	The effect of ocean acidification on the shell size of <i>Ammonia beccarii</i>	Spring Valley HS	Dale Soblo	\$70.00
Trevor Auman	The effects of amino acid concentration and pH on the growth of <i>Saccharomyce cerevisiae</i> in a lead chloride enriched medium	Spring Valley HS	Dr. Robin Henderson	\$143.57
Payne Montgomery	The effect of an electrolyte supplement on formation of lactate during intense exercise	Spring Valley HS	Dr. Robin Henderson	\$250.00
Troy Szadek	The effect of vermin composting on biodegradable bottles.	Spring Valley HS	Dale Soblo	\$75.55
Yvonne Kao	Comparison of mammalian embryo development under varying laboratory environments	SC Governor's School	Dr. H. Lee Higson III	\$250.00
Aurel Lazar	Evaluation the water condensing properties of various materials in a low cost condenser for plant growth in simulate arid climate conditions	Spring Valley HS	Michelle Sutton	\$200.00
Christopher Pasco	The effect of lead concentration on the growth rate of <i>Agropyrum esculentum</i> with special reference to phytoremediation applications	Spring Valley HS	Dale Soblo	\$62.15
Sudeep Surithankar	Does students' reading speed correlate to students' comprehension ability, reading fluency, decoding skills, reading accuracy, or the Chapman and Cook speed of reading test.	Spring Valley HS	Michelle Sutton	\$250.00
Jason Jakiela	The effect of titanium dioxide concentration on a staining solution applied to cotton fabric.	Spring Valley HS	Dale Soblo	\$250.00
Jacqueline Dallman	The effect of Ginkgo biloba on an individual's memory.	Spring Valley HS	Dale Soblo	\$250.00
Lauren Nixon	The effect of salt speed on recognition time in relation to <i>Retinis Pigmentosa</i>	Spring Valley HS	Dale Soblo	\$250.00
Total				\$2,051.27

**2007 MESAS MAIL-IN CONTEST
SETS YET ANOTHER RECORD NUMBER OF
ENTRIES: 806**

Winners Announced May 2007

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 806 entries, with 691 students from grades 4-6 and 115 students from grades 6-8. This year, the contests proved to be especially challenging and covered a broad range of topics with an emphasis on Chemistry and Engineering. We are grateful to the University of South Carolina for the creation of this year's contest. The authors of the 2007 contest are faculty and staff from USC. They are faculty and staff from the University of South Carolina - Columbia: Dr. Robert Feller – Dept. of Biology, Dr. Hans-Conrad zur Loye – Dept. of Chemistry, Dr. Donald Griffith – Dept. of Engineering, Ms. Dana Hutto – Center for Science Education and Director of SC², and Dr. Don Jordan – Center for Science Education and MESAS Director.

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 14 students from **SIX** regions who submitted the best overall papers. **Region IB:** Megan Lollis of Cherokee Trail Elementary & John Isenhower of Cambridge Academy; **Region II:** Elijah Goodson of Oak Grove Elementary, Alison Waldman of Harbison West Elementary, Keri Register of Westin Academy & Afia Khan of EL Wright School; **Region III:** Joe Ringel of West View Elementary; **Region V:** Carl Merting of Gregg Middle School, Sarah Graham of JSJ Academy, Charlie Lewis, Emily Bacher & Amy Chang of Rollings Middle School; **Region VI:** Adriana Loza of Hampton Elementary; **Region VII:** TJ Melanson of Hilton Head Middle School. The above students are this year's Grand Prize Winners. Congratulations!

The contest scores were very good overall and a large percentage of the entrants qualified for an award. We had 206 winners out of 806 participants (approx 26% 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. The next page lists the winners, their prize, and school information.

Grade	GRAND PRIZE WINNERS	Award	School	Region
4	Elijah Goodson	\$100	Oak Grove Elementary School	II
4	Adriana Loza	\$100	Hampton Elementary School	VI
5	Alison Waldman	\$100	Harbison West Elem. School	II
6	Megan Lollis	\$100	Cherokee Trail Elem. School	IB
6	Carl Merting	\$100	Gregg Middle School	V
6	Sarah Graham	\$100	JSJ Academy	V
6	TJ Melanson	\$100	Hilton Head Middle School	VII
7	John Isenhower	\$100	Cambridge Academy	IB
7	Afia Khan	\$100	EL Wright School	II
7	Keri Register	\$100	Westin Academy	II
7	Charlie Lewis	\$100	Rollings Middle School	V
7	Amy Chang	\$100	Rollings Middle School	V
8	Emily Bacher	\$100	Rollings Middle School	V
	Joe Ringel	\$100	West View Elementary School	III
	STATE PRIZE WINNERS	Award	School	Region
4	Caroline Dunn	\$75	Centerville Elementary School	IA
4	William Ford Tolar	\$75	LB Nelson Elementary School	II
5	Paul Pepper	\$75	Keowee Elementary School	I
5	Alyssa Broecker	\$75	Edisto Elementary School	II
5	Ariel Jackson	\$75	Ashley River Creative Arts	V
5	Paul Glenn	\$75	RCES Campus B	VI
5	Alia Faith Aaron	\$75	Saluda Elementary School	VI
6	Abigail Tolar	\$75	Dent Middle School	II
6	Andrew Wicker	\$75	Mid-Carolina Middle School	II
6	Grace Westbury	\$75	Dorchester Academy	V
7	Elizabeth Nichols	\$75	Mid-Carolina Middle School	II
7	Lillie Jackson	\$75	J E T Middle School	VI
8	Cole Mickey	\$75	Bates Middle School	II
8	Bushra Rahman	\$75	Crescent Academy	II
8	Lauren Masters	\$75	Masters Academy	V
	REGIONAL PRIZE WINNERS	Award	School	Region
4	Jack Willis	\$50	Keowee Elementary School	I
4	Sarah Dover	\$50	Keowee Elementary School	I
4	Samuel Jones	\$50	Montessori School of St. Andrews	II
4	Hannah Brunson	\$50	Richard Carroll Elementary School	II
4	Logan Robinson	\$50	Richard Winn Academy	II
4	Luke Fort	\$50	White Knoll Elementary School	II
4	Maya Rush	\$50	McCormick Elementary School	IV
4	Miranda Blystone	\$50	Sedgefield Intermediate School	V
4	David DeLoach	\$50	Hampton Elementary School	VI
4	Cindy Weekley	\$50	Hampton Elementary School	VI
4	Charles Mealer	\$50	North Augusta Elementary School	VI
5	Dillon Porter	\$50	Faith Baptist School	I
5	Morgan Werts	\$50	Pomaria-Garmany Elem. School	II
5	Cole Stroup	\$50	Limestone Central Elem. School	III
5	Pierce Matthews	\$50	Matthews Academy	III
5	Brian Lentz	\$50	Coosa Elementary School	VII
6	Dallas Porter	\$50	Faith Baptist School	I
6	Logan McFall	\$50	Wren Middle School	I
6	Jeremy Fowler	\$50	Wren Middle School	I
6	Chandler Thompson	\$50	Cherokee Trail Elem. School	IB
6	Hannah Quackenbush	\$50	Hand Middle School	II
6	Melissa Groleau	\$50	Hand Middle School	II
6	Blake Warren	\$50	Mid-Carolina Middle School	II
6	Thomas Jones	\$50	Seton Homeschool	II
6	Gabrielle York	\$50	St. Andrews Middle School	II
6	Jeremy Wu	\$50	Wu Family Homeschool	II
6	Gracin Watson	\$50	Chesnee Middle School	III
6	Lawson Gorman	\$50	SC School for the Blind	III
6	Taylor Ruth	\$50	SC School for the Blind	III
6	Paul Lee	\$50	Moore Intermediate School	IV
6	James Tavelle	\$50	Macedonia Middle School	V
6	Colby Martin	\$50	Palmetto Academy	V
6	Adam Lipsitz	\$50	Beaufort Middle School	VII
6	Tommy Vater	\$50	Hilton Head Middle School	VII
7	Drew Wolfe	\$50	Cambridge Academy	IB
7	Drew Ricard	\$50	Mid-Carolina Middle School	II
7	Arjun Aggarwal	\$50	Pleasant Hill Middle School	II
7	Joseph Redzikowski	\$50	Rollings Middle School	V
7	Curtis Beck	\$50	Hilton Head Middle School	VII
8	Paul Czeresko	\$50	Homeschool	II
8	Eric Kao	\$50	Riverside Middle School	III
	Matthew Armstrong	\$50	West View Elementary School	III

Grade	REGIONAL PRIZE WINNERS	Award	School	Region
	Connor Bastin	\$50	West View Elementary School	III
	Asrar Alimohamed	\$50	Westview Elementary School	III
Grade	SCHOOL PRIZE WINNERS	Award	School	Region
4	Cailyn Lee	\$25	Centerville Elementary School	IA
4	Aon Ali	\$25	Cambridge Academy	IB
4	Sydney Ellen	\$25	Brennen Elementary School	II
4	Taylor Proctor	\$25	Edisto Elementary School	II
4	Regan Sadler	\$25	Round Top Elementary School	II
4	Lauren Yam	\$25	Holly Creek School	II
4	Shivani Kapur	\$25	White Knoll Elementary School	II
4	Caleb Kisby	\$25	Crestview Elementary School	III
4	Morgan Wood	\$25	Hampton Elementary School	VI
4	Adam Blocker	\$25	Hampton Elementary School	VI
4	Austin Terry	\$25	Hampton Elementary School	VI
4	Julian Rhodes	\$25	Hampton Elementary School	VI
4	Justin Terry	\$25	Hampton Elementary School	VI
4	Jamie Padgett	\$25	Hampton Elementary School	VI
4	Robert Mills	\$25	Hampton Elementary School	VI
4	Jesse Hadwin	\$25	Hampton Elementary School	VI
4	Kade Rodgers	\$25	Saluda Elementary School	VI
4	Hannah Wickland	\$25	Hilton Hd. Sch.I for the Creative Arts	VII
5	Alex Thomas	\$25	Dacusville Elementary School	I
5	Noah Porter	\$25	Dacusville Elementary School	I
5	Kerrigan Galloway	\$25	Pickens Elementary School	I
5	Cami McMinn	\$25	Pickens Elementary School	I
5	Valerie Riddle	\$25	Holly Springs Elem. School	I
5	Jessica Gravely	\$25	Hagood Elementary School	IA
5	Lydia Clarke	\$25	Honea Path Middle School	IA
5	Jacob Thornton	\$25	Pine Crest Elementary School	IB
5	Ryo Yoshimura	\$25	Pine Crest Elementary School	IB
5	Najia Williams	\$25	Conder Elementary School	II
5	Angelette Weaver	\$25	Conder Elementary School	II
5	Simran Matthews	\$25	Covenant Christian School	II
5	Hannah Fogle	\$25	Edisto Elementary School	II
5	Augustine Carter	\$25	Lake Murray Elementary School	II
5	Sarah Brice	\$25	LB Nelson Elementary School	II
5	Savannah Ballard	\$25	LB Nelson Elementary School	II
5	Kayla Sullivan	\$25	Pineview Elementary School	II
5	Sarah Coleman	\$25	Richard Winn Academy	II
5	Brandon Ricard	\$25	Gilbert Elementary School	II
5	Tyler Farrell	\$25	Harbison West Elem. School	II
5	Palmer Reynolds	\$25	Round Top Elementary School	II
5	Jed Gist	\$25	Round Top Elementary School	II
5	Matthew Lewis	\$25	Sacred Heart Catholic School	II
5	Emily Salonich	\$25	Saluda River Academy	II
5	Tiana Timmons	\$25	Chavis Elementary School	IV
5	Brandon Young	\$25	McCormick Elementary School	IV
5	Richard Galloway	\$25	North Hartsville Elementary School	IV
5	Kelly Brown	\$25	Ruby Elementary School	IV
5	Darla Wendlandt	\$25	Beech Hill Elementary School	V
5	Taylor Carter	\$25	Beech Hill Elementary School	V
5	Matthew Leech	\$25	College Park Elem. School	V
5	Daria Light	\$25	Light Academy	V
5	Jordan Janikowski	\$25	Sangaree Intermediate School	V
5	Wil Gilland	\$25	RCES Campus B	VI
5	Rebecca Cook	\$25	Hampton Elementary School	VI
5	Brett Terry	\$25	Hampton Elementary School	VI
5	Rogan Gibson	\$25	Hampton Elementary School	VI
5	Cassie Kemmerlin	\$25	Hampton Elementary School	VI
5	Indie Smith	\$25	Hampton Elementary School	VI
5	Brenden Moore	\$25	Hampton Elementary School	VI
5	Caitlin Ball	\$25	Hampton Elementary School	VI
5	Michaela Conder	\$25	Hampton Elementary School	VI
5	Colette Kemmann	\$25	Coosa Elementary School	VII
5	Hunter Pylant	\$25	Coosa Elementary School	VII
6	Nicholas Reinovsky	\$25	Pickens Middle School	IA
6	Andrew Shealy	\$25	Crossroads Middle School	II
6	Quenton Stokes-Brown	\$25	Dent Middle School	II
6	Robert Harden	\$25	Ellorete Elem./Middle School	II
6	Zoel Stackhouse	\$25	Felton Laboratory School	II
6	Polina Aleshina	\$25	Hand Middle School	II
6	Maddie Norris	\$25	Heathwood Hall	II
6	Shaquela Boyd	\$25	St. Andrews Middle School	II
6	Kelsey Washington	\$25	Chavis Elementary School	IV
6	Jami Bunton	\$25	CE Williams Middle School	V

Grade	SCHOOL PRIZE WINNERS	Award	School	Region
6	Ashani Ranwala	\$25	Rollings Middle School	V
6	Mark Deshner	\$25	Gregg Middle School	V
6	A J Saracina	\$25	Gregg Middle School	V
6	Ashley Hogan	\$25	Trinity Homeschool Academy	V
6	Sarah Pirkel	\$25	Trinity Homeschool Academy	V
6	Breanna Ardis	\$25	Lockett Elementary School	VI
6	Barylyn Salmond	\$25	Hampton Elementary School	VI
6	Mieala Wachowski	\$25	Hampton Elementary School	VI
6	Jeremy Luten	\$25	Hampton Elementary School	VI
6	Breanna Murdaugh	\$25	Hampton Elementary School	VI
6	Wyatt Peoples	\$25	Hampton Elementary School	VI
7	Timothy Engler	\$25	Cherokee Trail Elem. School	IB
7	Sara Jane Bush	\$25	Cherokee Trail Elem. School	IB
7	Christopher Lewis	\$25	Sacred Heart Catholic School	II
7	Rachel Grosick	\$25	Sneed Middle School	IV
7	Elizabeth Ecklar	\$25	Branchville High School	V
7	Micah Workman	\$25	Rollings Middle School	V
7	Jessica Ford	\$25	Rollings Middle School	V
8	Arielle Barraca	\$25	Cambridge Academy	IB
8	Amanda Perez	\$25	Cambridge Academy	IB
8	Teddi Steadman	\$25	Cambridge Academy	IB
8	Raven Woodruff	\$25	Gray Court-Owings	IB
8	Trey Dendrinis	\$25	Dendrinis Homeschool	II
8	Sona Tailor	\$25	EL Wright School	II
8	LaVesha Parker	\$25	Summit Parkway	II
8	Jessica Kohl	\$25	Kohl Discovery School	V
8	Chris Armock	\$25	Rollings Middle School	V
	Katie Laken Weeks	\$25	Fork Shaols Elementary School	IB
	Devonte Davis	\$25	EL Wright School	II
	Ariel Ruff	\$25	LIFE Academy	V
Grade	SCHOOL PRIZE WINNERS	Award	School	Region
3	Anna-Marie Schnese	Cert.	Camden Elemenatry School	II
4	Dalton Truesdale	Cert.	Fairfield Intermediate School	II
4	Dante Joyner	Cert.	Hampton Elementary School	VI
5	Elizabeth Stauder	Cert.	Clemson Elementary School	IA
5	Savannah Rodgers	Cert.	Long Cane Elementary School	IB
5	Ja'Brea Woodard	Cert.	Fairfield Intermediate School	II
5	Marlene Ramirez	Cert.	Fairfield Intermediate School	II
6	Ashby Holmes	Cert.	Greeleyville Elementary School	I
6	Kathleen Fahey	Cert.	Pickens Middle School	IA
6	Madeline Stone	Cert.	Crayton Middle School	II
6	Jeremiah Prince	Cert.	Crossroads Middle School	II
6	Chelsie Kelly	Cert.	Fairfield Intermediate School	II
6	Mark Carroll	Cert.	Fairfield Intermediate School	II
6	Deandra Benson	Cert.	Midlands Math & Business Acad.y	II
6	Kymerly Wilson	Cert.	Newberry Middle School	II
7	Ebony Coleman	Cert.	Alcorn Middle School	II
7	Tomasha McIntyre	Cert.	Greer Middle School	III
7	Monique Ginyard	Cert.	AL Corbett Middle School	VI
7	Denzel Hampton	Cert.	Scotts Branch Intermediate School	
8	Lauren Simons	Cert.	WG Sanders Middle School	II
8	Torrey Wilson	Cert.	SC School for the Blind	III
8	Jonathan Lovoior	Cert.	West View Middle School	V
	Ariel Weeks	Cert.	Midlands Math & Business Acad.	II
	E'Quasha K	Cert.	AL Corbett Middle School	VI

ANNOUNCING

FALL WORKSHOP
For
MIDDLE/ELEMENTARY SCHOOL
ACADEMY OF SCIENCE

Fall Workshop Date: September 29, 2007

Newberry College

Registration Deadline: September, 19, 2007

Charles N. Horn, PhD
Chair, Department of Biology & Chemistry
Newberry College, 2100 College Street
Newberry, SC 29108
Phone: (803) 321-5257 E-mail: charles.horn@newberry.edu

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

Keynote Address:

Dr. Bill Hilton, Jr.

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

IN ADDITION, THERE WILL BE:

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

Topics include:

Build & Launch your own Rocket; See Sound for the First Time; learn about chemical reactions; Make Earrings Using Chemistry; find out how to excavate a shipwreck. Chain Gang & Chemistry, Polynomials & Polymers, study environmental forensics, explore ETV's Knowitall, learn to juggle and find out how it helps you in school, review critical thinking and basic mathematical skills, use aquatic organisms to determine if a water body of the state is populated, understand acids & bases & their effect on indicators, investigate the motions of our star, and much, much more!

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:

Don Jordan c/o

Anthony Kurlychek, Assistant to MESAS
College of Arts & Sciences / Center for Science Education / Sumwalt Room 321 /
University of South Carolina / Columbia, SC 29208

Phone: (803) 777-8759; or FAX (803) 777-4396; or E-mail: kurlycha@gwm.sc.edu

Web: www.acadsci.org click on MESAS

NURTURING SCIENCE AND MATH IN SOUTH CAROLINA

For GRADES 4-8

Sponsored by the South Carolina Academy of Science & Newberry College

South Carolina Academy of Science Middle/Elementary School Workshop, Newberry College 9/29/2007
Sponsored by the South Carolina Academy of Science

Total Attendance:

Session	Grade Level										Ethnicity								
	F	M	Total	K	1	2	3	4	5	6	7	8	Other	Nat. Amer.	Asian	Afr. A.	Hisp.	Caucasian	Other
1	4	8	12				2	4	1		2		3				5	1	6
2																			
3	15	4	19	1				9	1	1			7	2		11	1	4	1
4	1	6	7				1	2		2			2		2			4	1
5	11	2	13					5	6		1	1	2	1	2	7		3	
6	9	2	11							2	1	3	4			5		5	
7																			
8	10	5	15				9	2	1	1	1		1		1	10		3	1
9	9	5	14				4	6	1	1	1	1			5		8	1	
10																			
11	4	10	14	1				6	3	1	1	1	1			8		6	
12																			
13																			
14																			
15																			
16	16	3	19				1	3	14	1						13	1	4	1
17	12	12	24					6	11	1	3		3	2	2	10	1	7	2
18	6	6	12					1	11						9	2			
19	8	7	15					2	8	1	2	2	2	1	11		3	1	
20	5	4	9					2	2	5				1	7		1		
21																			
22																			
23	18	2	20							11	1	4	3			10		6	1
24	5	10	15					2	5	2	2	4		1	1	5	1	4	2
25	12	5	17					3	8	5			2		10	7			
26	6	2	8						1	5	1	1					5	3	
27	2	5	7					1		4	1	1				3		4	
28	14	5	19				1	8	1	4	1	2	1	3	1	12	1		1
29	10	12	22					6	4	7		4			14		3	3	
30	19	10	29				1	9	12	2	1	2	1	1	19	1	6	1	
31	7	3	10					7	1				1	1	3	6			
Total	203	128	331	1	2	1	19	82	93	51	17	20	39	13	18	170	26	80	16
%	61.3	38.7		0.3	0.6	0.3	5.8	25.2	28.6	15.7	5.2	6.2	12	4	5.8	52.8	8	24.8	5
Total = 331																			
Total = 323																			

The Following Sessions did not turn in evaluation forms:
2,7,12
13-15
21-22

Approximately 7 people were in attendance for the USC Midlands MIESAS Newberry College Workshop on September 29, 2007. Of these, approx. 331 filled out evaluation forms. Of those 383, 61% were female and 39% were male. Also, approx. 52.6% were African American, 24.8% were Caucasian, 5% were of other nationality, 4% were Native American, 5.6% were Asian or Pacific Islander, and 8% were Hispanic.

There were 7 people registered for the MIESAS event. Of those, 331 turned in evaluations on the session. Some participants did not fill out every category.

South Carolina Science & Engineering Fairs 2007

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 2007 activities 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: March 5, 2007

Location for Competition: Palmetto Expo Center, Greenville, SC

DATES: Monday & Tuesday, March 19 & 20, 2007 from 2-9PM.

Location for Awards Ceremony: Palmetto Expo Center

AWARDS: Monday, March 26, 2007 : Sends 1-2 teachers and up to 3 students to the Intel International Fair.

SPONSORS: Rotary Club of Greenville, Roper Mountain Science Center and the South Carolina Academy of Science

Contact: Mr. Greg Cornwell Roper Mountain Science Center; 402 Roper Mountain Road

Greenville, SC 29615; Ph: (864) 679-7002, Fax: (864) 679-7049.E-mail: gcornwel@greenville.k12.sc.us

IB. Western/Upstate SC Region 1B Science Fair;

Counties: Anderson, Oconee, Pickens

Serves: Students in grades 6-12 in two divisions: Junior - Grades 6-8 and Senior - Grades 9-12

Includes AOP Regional Elementary Science Fair for Grades 4 and 5.

Web page: www.aopscifair.org

Location for Competition: Clemson University, SC

DATES: February 22, 2007 at Madren Center, Clemson, SC

AWARDS: March 15, 2007 at Brooks Center, Clemson University - Sends 1-2 teachers and up to 5 students to the Intel International Fair.

SPONSORS: Clemson University, Duke Power, South Carolina Academy of Science and Wal-Mart

Contact: Angela Foxx; AOP Regional Science Fair; PO Box 8083; Seneca, SC 29678;

Ph: 864-882-7739; e-mail: SciFair@earthlink.net

II. Central South Carolina Region II Science and Engineering

Fair”Counties: Calhoun, Clarendon, Fairfield, Kershaw, Lexington,

Newberry, Orangeburg, Richland, Sumter”**Serves:** Students in grades 5-12 in three divisions: Junior - Grades 6-8; Senior - Grades 9-12; and Teams

Web page: www.hrsmsc.edu/jordan

DATES: March 23, 2007

AWARDS: Wednesday, March 28, 2007 Koger Center at USC Sends 2

teachers and up to 8 students to the Intel International Fair.

SPONSORS: USC's President's Office; Provost's Office; College of Arts & Sciences; College of Engineering; EPSCoR; College of Hospitality, Retailing and Sports Management; Sponsored Programs and Research; Division of Regional Campuses and Continuing Education; and The South Carolina Academy of Science sponsor the USC Central South Carolina Region II Science and Engineering Fair.

Location for Competition: Carolina Coliseum, University of South Carolina, Columbia, SC.

Contact: Dr. Don M. Jordan: E-mail: jordan@gwm.sc.edu Sumwalt Room 323, Science Education Center, CAS, USC, Columbia SC 29208; Ph: (803) 777-7007; Fax: (803) 777-4396

III. Piedmont Region III Science Fair

Counties: Cherokee, Chester, Spartanburg, Union, York and Lancaster

Serves: Students in grades 1-4 (Elementary), 5-8 (Middle), and 9-12 (High School).

Web page: TBA

Location for Competition: USC Upstate, Hodge Gym, Spartanburg, SC

Dates: March 20-24, 2007

Awards: TBA 2007 in the Campus Life Center Ballroom - Sends 1 teacher and 2 students to the Intel International Fair.

Sponsors: USC Spartanburg and the Spartanburg Rotary Club

Contact: Dr. Lyle Campbell; USC Upstate; 800 University Way; Spartanburg, SC 29303

Ph: 864-503-5751, Fax: 864-503-5366; E-mail: lcampbell@uscupstate.edu

IV. Sandhills Region IV Science Fair

Counties: Chesterfield, Darlington, Dillon, Florence, Horry, Marion, Marlboro

Serves: Students in grades 6-12 in two divisions: Junior - Grades 6-8 and Senior - Grades 9-12

Web page: TBA

Location for Competition: Francis Marion University, Florence, SC

Dates: March 16-17 2007.

AWARDS: Sends 1-2 teachers and up to 5 students to the Intel International Fair ;

Other Awards: Gold, silver and bronze medals to 1st, 2nd and 3rd place winners in 13 Sr. and 7 Jr. categories; special awards and certificates of merit.

SPONSORS: Florence Civitan Club

Contact: Contact: Dr. Richard D. West - Dept. of Mathematics, Francis Marion University

Phone: 843-661-1579; E-mail: rwest@fmarion.edu

V. Lowcountry Region V Science Fair

Counties: Berkeley, Charleston, Colleton, Dorchester, Georgetown

Serves: Students in grades 5-12 in two divisions: Junior - Grades 5-8 and Senior - Grades 9-12

Web page: TBA

Location for Competition: Omar Shrine Temple, Mt. Pleasant, SC

Dates: March 21, 2007.

AWARDS: April 6, 2007 - Physician's Auditorium, College of

Charleston Sends 1 teacher and 2 students to the Intel International Fair.

SPONSORS: Patriots Point Foundation Cold War Submarine Memorial Fund, College of Charleston, Charleston County School District, SC Sea Grant Consortium, Omar Shrine Center, Hamby Catering

Contact: Starr Jordan, Director, Region V, College of Charleston, 66 George Street, Charleston SC 29424, Phone: 843-953-7847;E-mail: jordank@cofc.edu

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

Counties: Aiken, Allendale, Bamberg, Barnwell, Edgefield, Hampton, McCormick, and Saluda counties in SC as well as some portions of Georgia
Serves: Students in grades 4-12 in three divisions: Elementary Division 4-5; Junior Division 6-8;and Senior Division 9-12.

Web page: www.CSRAScience.org

Location for Competition: Augusta State University, Augusta, GA

Dates: No competition in 2007

AWARDS: None in 2007 Sends 1-2 teachers and up to 5 students to the Intel International Fair.

SPONSORS: CSRA Science and Engineering Fair, Inc.

Contact: Richard A. Hane, Savannah River Technology Center Bldg. 703-45A Aiken SC

Aiken, SC 29808; Voice: 803-725-5881, Fax: 803-725-8727; E-mail: richard.hane@srs.gov

VII. Sea Island Region Science and Engineering Fair

Counties: Beaufort and Jasper

Serves: Students in grades 6-12 in three divisions: Middle School - Grades 6-8, Junior - Grades 9-10 and Senior - Grades 11-12.

Web page: There will be a link through HHPrep.org in the early Fall.

Location for Competition: Hilton Head Prep School, Hilton Head Island, SC

Dates: March 14, 2007: Junior/Senior Division, **March 15th, 2007:** Middle School (Dates are tentative)

AWARDS: March 19, 2007 Sends 1-2 teachers and up to 5 students to the Intel International Fair.

SPONSORS: Public and Private schools in Beaufort and Jasper Counties.

Contact: Ms. Tina Webb-Browning, E-mail: Twebb@hhprep.org, Ph: 843-671-2286 x236, Fax: 843-671-7624 Hilton Head Preparatory School; 8 Fox Grape Road; Hilton Head, SC 29928

VIII. South Carolina Independent School Association, Director TBA

Private SCISA member schools State Wide

Web page: www.scisa.org

Fair dates: TBA 2007

Location: Orangeburg Preparatory School

IX. SC ISEF Comm. Chr., Tina Webb-Browning

Contact: Tina Webb-Browning, E-mail: Twebb@hhprep.org, Phone:(843)-671-2286 x236.

Fair Dates: ISEF, Albuquerque, NM, **May 13-19, 2007.**

Web page: www.sciserv.org

The **South Carolina Academy of Science** is a nonprofit organization running many entities in South Carolina such as Discovery Fair, Junior Academy Workshops and an Annual Meeting (forum for students to present papers). The Council of SCAS is staffed

by non-paid science and educational professionals from throughout South Carolina who volunteer thousands of hours annually to support the advancement of critical needs areas such as science, math and engineering for the benefit youth of South Carolina. Funds raised are totally used to support students research, awards and grants, and for travel expenses to the International Fair, as well as for many other national programs for students.

Chairman, S.C. Science Fair Committee

Ms. Tina Webb
14 Sugaree drive
Bluffton, SC 29425.
Twebb@hhprep.org

**South Carolina Science & Engineering Fairs
2007 Activity Reports**

**IA. Upstate SC Region IA Science Science and Engineering Academic
Competition**

NO 2007 REPORT RECEIVED

IB. Western/Upstate SC Region 1B Science and Engineering Fair

NO 2007 REPORT RECEIVED

II. Central South Carolina Region II Science and Engineering Fair

Submitted by Dr. Don M. Jordan, Director

The University of South Carolina hosted the Central South Carolina Region II Science & Engineering Fair on March 23, 2007. Students from nine counties (listed above) competed for over \$30,000.00 in scholarships, savings bonds and trip awards.

Six hundred seventy-one (671) students and one hundred thirty-three (133) teachers participated in the fair, which included 66 Schools, (53 Middle / Elementary Schools and 13 high schools). The students were selected by Two Hundred fourteen (214) judges comprised of college professors, medical scientists, U.S. Army, Marine and Air Force Officers, as well as business leaders from the Midlands community. Awards were available in 52 major categories, such as Engineering, Women in Science, Vision Science, Chemistry, etc. Most awards had Junior, Senior and Team subcategories, often with 1st, 2nd, 3rd and Honorary Mention standings awarded. There were a total of 340 awards given among those varied categories and standings. Students with very good projects had a possibility of winning awards in one or more categories. There were best overall standings for grades 5-12, as well as for best individual Junior Division, Senior Division and Team Division projects.

Participation in science fairs on the local, regional, and national/international levels presents opportunities to students for travel and interaction with scientists from both academic and industrial backgrounds. The next level of competition is at the **International Science and Engineering Fair (ISEF)**, which is held annually and features the best regional/national student projects from around the world. Our regional judges selected six students and two teachers to be in the Official Party to represent South Carolina at ISEF in Albuquerque, New Mexico, May 13-19, 2007.

The **University of South Carolina**, with support from the **South Carolina Academy of Science**, sent the following students to **ISEF**: Grand Prize Team Senior Division winners, **Kaitlyn Rainwater and Ariel Guinn** of Dreher High School, Grand Prize Female Senior Division winner **Shivani Agarwal** and Grand Prize Male Senior Division winner **Graham Van Schaik** of Spring Valley High School. Students to be sent as official observers are **Ryan Moran** and **Lauren Nixon** of Spring Valley High School. USC will certify **Lisa McAlpine and Robin Henderson** of Spring Valley High School and **Judith Ray** of Dreher High School to lead the official ISEF party for the State of South Carolina. In addition, students **William Newsome** of Spring Valley High School, **Alex Mao Zhang** of Dreher High School, **Lauren Nixon** of Spring Valley High School, and **Deborah Ann Beihl** of Forest Creek Academy Homeschool have won Male and Female 2nd & 3rd place awards, respectively.

Graham van Schaik of Spring Valley High School won first place in the Environmental Science category and Best of Show in the Environmental Science competition. **Shivani Agarwal**, also of Spring Valley, won third place in the Bio-Chemistry category at the International Science & Engineering Fair (ISEF) held in Albuquerque, NM. The ISEF is the largest pre-collegiate science and engineering competition in the world with over 1500 participants from the U.S. and 50 countries, and over \$4 million dollars in awards given out.

Graham, who placed second in this competition last year, won \$8000 and a laptop computer presented by the Intel Foundation for his project titled "Pyrethroids and Neurodegeneration: The Absorption of Pyrethroids into *S. domesticus* (pig) Lungs and the Effect of the Recovered Pyrethroid Levels on PC12 Neurite Retraction." He was advised by Dr. Paul Housley of the USC School of Medicine. Shivani won \$1000 presented by Agilent Technologies for her project titled "The Effect of Green Tea EGCG on the Ability of p25-Activated Cyclin-Dependent Kinase 5 (cdk5) to Induce Cell Death in cos-7 Kidney Cells: Implications for Alzheimer's Disease." Her mentor was Dr. Deanna Smith of the USC Biology Department.

Spring Valley High School and the USC Region II Science and Engineering Fair will also receive \$1000 each in recognition of the work of these students. Dr. Don Jordan, Director of the USC Region II Fair says, "This is no small win for South Carolina's USC Region II Science and Engineering Fair or these terrific students, as we must compete against the magnet schools in Virginia, New York, Ohio, and California as well as very many gifted international students".

DISCOVERY CHANNEL YOUNG SCIENCE CHALLENGE / HISTORICAL CHANGES

We have worked hard in the past several years to strengthen the USC Central South Carolina Science & Engineering Fair. We made it possible for sixth graders to become eligible for the Region II Science & Engineering Fair in 1996. We re-introduced Team Projects in 1997. In 1999, we lowered the grade limit to enable fifth-grade students in the nine-county region to become eligible.

We nominated 60 middle school students and five alternates to compete in DCYSC in 2007. DCYSC nominees receive national recognition from Science Service that includes an honor certificate, a DCYSC T-shirt, a lapel pin recognizing their achievement and an entry form to compete with 6,000 other students at the international level.

Three (3) from Region II were chosen by the Discovery Channel Young Scientist Challenge (DCYSC) as semifinalists (400 nation-wide). “These students have the knowledge, enthusiasm and imagination to become the scientific trailblazers of tomorrow,” said Judith A. McHale, President and CEO, Discovery Communications. The breadth and knowledge demonstrated by the 400 semifinalists is inspiring and sets an example for anyone who wants to explore the world around them. Chosen as three of the top 400 semifinalists from over 7,000 students who won a DCYSC nomination at their local, regional or state fair, the Region II semifinalists are: Arjun Aggarwal - Pleasant Hill Middle School, 7th grade, Teacher: Elizabeth Frazer, Title: *Can the Concept of Equilibrioception Be Applied in Robotics?*; Emily Bakaj - Dent Middle School, 8th grade, Teacher: Susan Yelton, Title: *The Effects of Nutrient vs. Antibacterial Substances on Escherichia coli Biofilms* and **Ian Wright** - Cardinal Newman Middle School, 8th grade, Teacher: Mary S. Burts, Title: *Local Concern: A Case of Bad Water*
USC Region II Winners of Grand Awards Junior Division

Calvin Hu (Dutch Fork Middle School, Sponsor **Trina Dickerson**) research project entitled *Pets vs. Allergies*, won First Place. **Kayla Phipps**, (Summit Parkway Middle School, Sponsor **Jennifer Sullivan**) research project entitled *What's Hot in Windows?*, won Second Place. **Elizabeth Basnight** (Dent Middle School, Sponsor **Marriah Schwallier**) project entitled *Got Thrust? Thrusting Evidence to Shift Your Worlds*. Also, the Best Project Awards by Grade were given as follows: 5th Grade – **Bushra Binte Islam** of the Islamic Academy of Columbia, 6th Grade – **Jeremy Wu** of the Wu Family Homeschool, 7th Grade – **Mary Katherine Thorne** of Crayton Middle School, 8th Grade – **Bushra Rahman** of Crescent Academy Homeschool. *In addition*, out of over 500 junior division participants from nine counties, the above three grand awards winners join sixty additional students that will represent South Carolina in the **Discovery Channel Young Science Challenge (DCYSC)** during the summer of 2007.

USC Science & Engineering Fair tours for Science Fair Students

The University of South Carolina sponsored six active and hands-on tours on March 23, 2007 for High School Students and Middle School Students who advanced to the USC Region II Science & Engineering Fair. The tours were scheduled between 12:30 PM to 5:30 PM on the afternoon of March 23, 2007.

Tour # 1: Geographic Information Systems (GIS): *Tour Hosted by the U.S.C. College of Arts & Sciences / Dept of Geography presented by Kevin Remington, GIS Campus Coordinator.*

Tour # 2: USC School of Medicine: Restricted Sections of the Medical University. *Careers in the Health Professions, Richard A. Hoppmann, M. D. Associate Dean for Medical Education and Academic Affairs.*

Tour # 3: Electron Microscopy Center: *Hosted and presented by Dr. Donggao Zhao – Basement of Coker Life Science Building, USC Campus.*

Tour # 4: Physics Lab Tour: Sponsored by the College of Arts & Sciences with **Dr. David Tedeschi** of the Physics Department as Host – Physical Science Building, USC Campus.

Tour # 5: College of Engineering: Sponsored by the College of Engineering, Department of Computer Science & Engineering –Room 1A00 College of Engineering & Information Technology, USC Campus.

Tour # 6: The Herbarium: Hosted and presented by **Dr. John Nelson**, College of Arts and Sciences – 208 Coker Life Science Building, USC Campus

The “WE COULDN’T DO IT WITHOUT YOU ‘AWARDS!’”

Many dedicated people provide much-needed support for the USC Region II Science & Engineering Fair.

These people make it possible! Special thanks go to:

President Dr. Andrew Sorensen
Office of the President

Provost Mark Becker
Office of the Provost

Dean Michael D. Amiridis
College of Engineering

Dean Mary Anne Fitzpatrick
College of Arts & Sciences

Dean Chris Plyler
Regional Campuses & Continuing Ed

Dr. Richard Hoppman
Interim Dean
USC School of Medicine

Dr. Harris Pastides
VP for Research
University of South Carolina

Marie McGehee
Colonial Supplemental Insurance
Sponsor – 2007 Judges Dinner

Dean Mary Ann Parsons
College of Nursing

Sincerely,



Don M. Jordan, Ph.D.
Director, USC Region II Science & Engineering Fair.

III. Piedmont Region III Science and Engineering Fair
NO 2007 REPORT RECEIVED

IV. Sandhills Region IV Science and Engineering Fair
NO 2007 REPORT RECEIVED

V. Lowcountry Region V Science and Engineering Fair

The 27th annual Lowcountry Regional Science and Engineering Fair was held March 21 at the Omar Shrine Center, Mt. Pleasant, SC. The Lowcountry Science Fair is open to students in grades 5-12 in Berkeley, Charleston, Colleton, Dorchester, and Georgetown counties. There were 154 students presenting 141 projects, representing three high schools and twelve elementary/middle schools. The student demographics are shown in Tables 1 and 2. At the 2006 Lowcountry Science Fair, 147 students presented 119 projects and represented five high schools and seven elementary/middle schools.

Caucasian	124
African-American	17
Asian	6
Hispanic	3
Other	3
Not Provided	1
TOTAL STUDENTS	154
Female	75
Male	79
TOTAL STUDENTS	154

The Lowcountry Science Fair is an affiliate of the Intel International Science and Engineering Fair (ISEF) and abides by their rules and regulations. This year, the projects were divided into three divisions: Junior 1 for fifth and sixth grades, Junior 2 for seventh and eighth graders, and Senior for high school students. Each project was then placed into one of the following categories, Behavioral and Social Sciences, Biological Sciences (includes botany, microbiology, and zoology), Chemistry and Biochemistry, Engineering, Geology and Environmental Science (includes earth and environmental science), Mathematics and Computer Science, Medicine and Health, Physics and Astronomy (includes physics and space science), and Team Projects. All categories were represented with projects. First, second and third place awards were given in each category for Senior and Junior Divisions (if applicable) as well as numerous special awards. There were approximately 70 judges from various organizations, College of Charleston, MUSC, The Citadel, and local businesses.

Awards Ceremony and Overall Winners

The Awards Ceremony was held Friday, April 6th at the College of Charleston’s Physicians Auditorium. Approximately 84 students received awards.

Overall first, second and third place winners in each division were awarded trophies and \$50, \$35 and \$25 cash respectively. The teachers of the first place overall winners in each division were awarded a \$50 BarnesandNoble.com gift card. The first and second place overall winners in the senior division, as well as the teacher of the first place winner, were provided an all-expenses paid trip to the ISEF in Albuquerque, New Mexico.

The Junior 1 Division first place winner was Keenen Friend, a sixth grade student from First Baptist Church School. His project in the Engineering category was titled “Beyond Splashdown: Landing Systems for Spacecraft Missions.” His teacher is Ms. Alicia Donohue.

The Junior 2 Division first place winner was Shea Socha, a eighth grade student from Pinewood Preparatory School. His project in the Geology and Environmental Science category was titled “Is the Ground You Stand on Slipping Away.” His teacher is Ms. Karen Hames.

The Senior Division first place winner was Alexander Romanczuk with his project in the Chemistry and Biochemistry category, “A Computational Examination of Sparteine.” The Senior Division second place winner was Yupeng Lui with her project in the Geology and Environmental Science category, entitled “Algicide Resistance in

the Growth Rate and Toxin Production of a Coastal Harmful Algal Isolate.” Alexander and Yupeng are seniors at Academic Magnet High School and students of Mr. Bruce Newton and Mr. Murray Eicher, respectively.

Sponsors

Corporate sponsors of the LSF include the College of Charleston School of Sciences and Mathematics and Lowcountry Hall of Science and Math, Patriots Point Foundation Cold War Submarine Memorial Fund, Omar Shrine Center, American Society for Quality, Image Network of Charleston, and SC SeaGrant.

Parent sponsors of the LSF include Jan & Barry Coulter, Dr. & Mrs. Milton J. Foust, Jr., Ferris Scott & Carleen Grant, Diane McCanick, Nadine N. Oelsner, The Shepard Family, Dr. & Mrs. Mark Greenslit, and the parents of Guilherme Porto.

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

NO 2007 REPORT RECEIVED

VII. Sea Island Region Science and Engineering Fair

NO 2007 REPORT RECEIVED

VIII. South Carolina Independent School Association

NO 2007 REPORT RECEIVED

IX. SC ISEF INTEL International Science and Engineering Fair

This year’s Intel International Science and Engineering Fair was held in Albuquerque, New Mexico during the week of May 13th. There were a total of 1,511 finalists representing 50 countries and United States Territories.

The South Carolina delegation consisted of participants from 7 regional fairs that included 22 finalists, 5 observers, and 24 adults. The “official” delegation had a total of 17 projects entered in the competition. Tina Webb-Browning from Hilton Head Prep School served as the Head Chaperone. She was assisted by Laura Shoun from Southside High School.

Albuquerque – ISEF Participants

Low Country Science Fair

Director – Starr Jordan

Finalist-Individual

Yupeng Liu

Alexander Romanczuk

Other

William Newton (Accompanying Adult-In-Charge/Teacher)

Anderson-Oconee Pickens Regional Science Fair

Director – Angela Foxx (not attending)

Finalist-Individual

Tara Batson

Other

Glenda Lofink (Teacher/Accompanying Adult-In-Charge)

Central South Carolina Region II Science & Engineering Fair

Director – Dr. Don Jordan (not attending)

Finalist-Individual

Graham Van Schaik

Shivani Argarwal

Finalist-Team

Kaitlyn Rainwater

Ariel Guinn

Observers

Ryan Moran

Lauren Nixon

Other

Lisa McAlpine (Accompanying Adult-In-Charge/Teacher)

Robin Henderson (Teacher)

Mr. and Mrs. Van Schaik (Parents)

Mandy Rainwater (Parent)

Sand Hills Regional Science Fair

Director – Richard West (not attending)

Finalist-Individual

Bonnie L White

Other

Mrs. White (*parent*)

Gerald Porter (Accompanying Adult-In-Charge/Teacher)

Upstate Regional Science Fair

Director – Lyle Campbell (not attending)

Finalist-Individual

Michael Green

Finalist – Team

Jason Morris

Jay Gill

Other

Kathy Green (teacher/parent)

Ray Tedder (Accompanying Adult-In-Charge/Teacher)

Greenville Co. and S.C. Regional Science & Engineering Fair

Director - Mr. Greg Cornwell (not attending)

Finalist-Individual

Ethan Josiah Walker

Xue Chi

Observer

Campbell Armstrong Yore

Other

Laura Jean Shoun (Accompanying Adult-In-Charge/Teacher)

Brian Joseph Yore (Parent)

Joanne Marie Armstrong (Parent)

Michael Wayne Walker (Parent)

Sea Island Regional Science Fair – Jr. Division

Finalist-Individual

Katie Stine
Jordy Harris
Finalist-Team
James Tyler Dunn
John Patrick Courtney
Observers
Nathaniel Weeks Rollings
TJ Melanson
Other
Glenn Burckart (Accompanying Adult-In-Charge/Teacher)
Robert Harris (parent)
Theresa Dunn (parent)
Raymond and Marian Rollings (Parents)
Judi Melanson (Parent)

Sea Island Regional Science Fair – Sr. Division
Director/Teacher/Advisory Council Member/ParentJ – **Tina Webb-Browning****

Finalist-Individual
Graham Gintz
Mac DeRose
Finalist-Team
Chelsey Webb
Alex Smith
Ryan Clark
Other
Diana Clark (Accompanying Adult-In-Charge/Parent)
Chris Gintz (Judge/Advisory Council Member/Parent)
Rebecca Smith (parent)
Sarah Benedik (Teacher)

*Assistant Head Chaperone

**Head Chaperone

The following projects from the South Carolina delegation won awards:

Michael Green
Digest This! How Food Affects the pH of the Gastrointestinal System
Biochemistry
South Carolina Association of Independent Home Schools, Teacher – Kathy Green
Piedmont South Carolina Region III Science Fair, Lyle Campbell - Director
Second Award of \$500 from The American Physiological Society

Bonnie White
Magnetic Field Influences on Various Fluid Viscosities
Physics
Mayo High School for Math, Science, and Technology, Teacher – Gerald Porter
Sand Hills Regional Science Fair, Richard West - Director
Second Award of \$150 from The Patent and Trademark Office Society

Ryan Clark, Alexandra Smith, and Chelsey Webb

Improving Laser Efficiency Using Rhodamine 6G in a Nd: YAG Laser
Physics – Team Project

Hilton Head Preparatory School, Teacher – Tina Webb-Browning
Sea Island Regional Science Fair, Tina Webb-Browning - Director

Second Award of \$1,500 from SPIE, The International Society for Optical
Engineering

Shivani Agarwal

The Effect of Green Tea EGCG on the Ability of p25-Activated Cyclin-Dependent
Kinase 5 (cdk5) to Induce Cell Death in cos-7 Kidney Cells: Implications for
Alzheimer's Disease

Biochemistry

Spring Valley High School, Teacher – Robin Henderson

USC Central South Carolina Region II Science and Engineering Fair,
Don Jordan - Director

Third Place Category Award - \$1,000

Graham Van Schaik

Pyrethroids and Neurodegeneration: The Absorption of Pyrethroids into *S. domesticus*
(pig) Lungs and the Effect of the Recovered Pyrethroid Levels on PC12 Neurite
Retraction

Environmental Science

Spring Valley High School, Teacher – Michelle Sutton

USC Central South Carolina Region II Science and Engineering Fair, Don Jordan -
Director

First Place Category Award - \$3,000

Intel Best of Category Award - \$5,000

Participants were treated to numerous special events including the Albuquerque Youth
Symphony, an international pin exchange, and a visit to the Explora Museum. Everyone
attended the Excellence in Science and Technology Panel. This panel consisted of the
following legendary scientists:

Dr. Jocelyn Bell Burnell, Astronomer – Herschel Medal, Royal Astronomical
Society - 1989

Dr. Robert F. Curl, Nobel Laureate, Chemistry – 1996

Dr. Dudley R. Herschbach, Nobel Laureate Chemistry – 1986

Dr. Leon Lederman, Nobel Laureate, Physics – 1988

Dr. Kurt Wuthrich, Nobel Laureate, Chemistry – 2002

Dr. Horst Stormer, Nobel Laureate, Physics - 1998.

The Intel International Science and Engineering Fair represents the most outstanding
academic competition and event for finalists, observers, and adults to become involved
with. To have the opportunity to meet and talk with students and scientists of this
caliber is truly awe-inspiring. South Carolina continues to compete favorably with the
rest of the world. Congratulations to all winners and to all those involved with making
science fair flourish in the state of South Carolina. Next stop: Atlanta, GA – ISEF 2008;
May 11-17

2007 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 considered as one selection (i.e. a team of 3 will take 3 of your selections).
- Nominations will be chosen from all grade levels.
- Judging will occur during our regular category judging.

The Prize

- Each nominee will receive a certificate of recognition, a t-shirt and a lapel pin as a prize at the Region II Fair for becoming a DCYSC Nominee. Nominees will also receive a DCYSC 2006 Entry Booklet that may be completed to enter the next phase of the competition.
- Entrants to the DCYSC compete to become one of 400 Semifinalists who each receive a \$25 Discovery gift certificate and a certificate of recognition. Forty of the 400 semifinalists will be named of the Finalists and will come for an all-expense paid trip to Washington, DC in October 2006 to compete for a share of over \$40,000-the top winner will win a \$15,000 college scholarship.
- If the winning student chooses to enter the next phase of competition, he or she will need to complete an entry booklet by the early June 2006 deadline. Entries are judged on the scientific merit, originality, and communication of the project and the essays.

Judging Criteria: (100 point scale)

1. Visual and written presentation (25)

- a. Does the display board and written materials demonstrate the student(s) understanding of the research?
- b. Is the material presented in a logical, orderly manner that is easily interpreted?

2. Interaction with judges (oral presentation): (75)

- a. Is the student(s) able to explain his/her project and the underlying science it involves logically and concisely?
- b. Does the student(s) demonstrate an understanding of the limitation of his/her research? Can the student provide possible ideas for furthering the research?
- c. Is the student comfortable in conversing about their project and science?

To learn more about the competition, please go to www.sciserv.org/dydc or www.discovery.com/dcysc

**Greenville Student to compete in
Discovery Channel's
Discovery Young Scientist Challenge**

GREENVILLE, SC - Discovery Communications announced **Darby Woodard** from Greenville, SC as one of 40 students selected nationwide to compete in the DYSC Challenge in Washington, October 21-24.

The finalists were selected from the 75,000 students who entered science fairs nationwide. As an eighth grader last May, Darby entered the Greenville County and South Carolina Regional Science and Engineering Fair representing Mitchell Rd. Christian Academy. Her project was titled: ***"Portion Distortion: Are Subtle Visual Cues Contributing to Our Expanding Waistlines?"*** She was one of 15 students selected to compete in the national challenge.

In Washington, Darby and the other finalists will take part in a series of team-based, interactive scientific challenges focused on this year's environmental theme, dubbed "Operation Green." The students will compete for more than \$100,000 worth of scholarships and special prizes, as well as the title of "America's Top Young Scientist of the Year."

"We are excited that Darby was selected nationally for her science investigation and communication skills that our judges saw in her at our fair. She will be an excellent representative for Greenville and South Carolina" noted Greg Cornwell, coordinator of the science and engineering fair.

Website:

Discovery Channel – DYSC Website

<http://school.discoveryeducation.com/sciencefaircentral/dysc/>

Three Students in the top 400 National Semifinalist By Dr. Don M. Jordan, USC Professor

The USC Region II Science & Engineering Fair, along with the College of Arts and Sciences, the Office of Research, The College of Engineering and USC School of Medicine is pleased to announce three semifinalists selected for the 2007 Discovery Channel Young Scientist Challenge as part of the top 400 semifinalists from over 7,000 students who won a DCYSC nomination at their local, regional or state fair. The three Region II semifinalists are:



Arjun Aggarwal

Pleasant Hill Middle School,
7th grade
Teacher: Elizabeth Frazer
Title: *Can the Concept of Equilibrium Be Applied in Robotics?*



Ian Wright

Cardinal Newman Middle School,
8th grade
Teacher: Mary S. Burts
Title: *Local Concern: A Case of Bad Water*



Emily Bakaj

Dent Middle School
8th grade
Teacher: Susan Yelton
Title: *The Effects of Nutrient vs. Antibacterial Substances on Escherichia coli Biofilms*

National evaluators and judges spent the summer reading and reviewing the entries looking for those students with projects that demonstrated scientific merit and originality and who were able to communicate this process clearly and creatively to the judges via the entry form. The result of their difficult job is the selection of the 400 DCYSC national semifinalists.

These talented students represent three of the nine semifinalists from the state of South Carolina. By the time of this announcement these students will have advanced to the next grade level.

From the national group of 400 Semifinalists, 40 Finalists will be chosen to attend an all-expenses paid trip to Washington, DC from October 20-24, 2007 to compete in science challenges. The 40 finalists will compete for discretionary experiential awards and to win over \$40,000 in scholarship monies with the top student winning a \$20,000 scholarship. Finalists will be announced on September 12, 2007. We would like to thank the 200 plus Judges for Region II at the 2007 USC Fair for their distinguished nominations and especially the teachers; Elizabeth Frazer of Pleasant Hill Middle, Lexington School District I, Susan Yelton, Dent Middle Richland II School District, and Mary S. Burts of Cardinal Newman Middle School. We hope South Carolina will be represented in the final 40. We especially appreciated The Support of the University of South Carolina and the Office of Research.

List of 2007 Discovery Young Scientist Challenge Semifinalists The list of the 40 finalists will be posted on **September 12, 2007.**

The other six semifinalists from the State of South Carolina are:

Ion Garcia - Greenville Middle Academy, 6th grade Title: *Inactive Ingredients in Pedialyte: Are They Really Inactive?*; Thomas McAllister - McCants Middle School, 7th grade, Title: *The Transpiration of Leaves*. Thomas Melanson - Hilton Head Middle School, 6th grade, Title: *Polymer Power: What Type of Compressible Material Most Efficiently Releases Energy?* Randal Parker - Laurens Middle School, 7th grade, Title: *Experiments in Holography*. PJ Tewell - Bryson Elementary School, 5th grade, Title: *Rolling on the Green, And Darby Woodard - Mitchell Road Christian School, 8th grade, Title: Portion Distortion: Are Subtle Visual Cues Contributing to Our Expanding Waistlines?*

Don Jordan Director USC Science & Engineering Fair.

THE MIDLANDS FINEST 2007

Sixty (60) Students from the Midlands were nominated by the International Science & Engineering Fair to compete nationwide this summer with other states in

THE DISCOVERY CHANNEL YOUNG SCIENTIST CHALLENGE

Discovery Communications, Inc., nominated 60 of the Midlands finest to compete in the 2007 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.



Calvin Ho
Deach Park Middle School



Mary Katherine Thorne
Crayton Middle School



Mary Louise King
Narvey Rd. Elementary School



Mercedes Letch Clement
Peach Springs Elementary School



Jeremy Wu
The Wu Family Homeschool



Mary Heath
Hammond School



Braden Davis Islam
Islamic Academy of Columbia



Braden Bakman
Crescent Acad. Homeschool



Kayla Phipps
Sawant Parkway Middle School



Edward Columbus
St. Joseph Catholic School



Emerson Shikant
Morrey Road Elementary



Stephen Mitchell
Hammond School



Arsen Aggarwal
Pleasant Hill Middle School



Carl M. Garris
Chapin Middle School



Andrew Bezzio
Deer Middle School



Marissa Mack
Logan Elementary School



Christian Stachek
Wimer Elementary School



Kristen Allen
Parran Middle School



Dreway Johnson
Holly Hill Elementary School



Alison Waldman
Harbison West Elementary School



Connor Furlkuta
Brennan Elementary



Daniel Lott
Crayton Middle School



Luke Thompson
Crayton Middle School



Austin Koller
Wilber Elementary School



Julian Stutz
Crossroads Middle School



Ian Wright
Cardinal Newman School

The photographs above are just 26 of the 60 students nominated from the Midlands. The other nominees are listed:

Student	Gr	School	Teacher	Sub Category
Jemiyah Warren	6	Bates Middle	Gary Bettinger	Engineering
Matthew Nelson	6			Engineering
Amanda Burr	8	Blythewood Middle	Cheryl Boyle	Physics
Abby Lindemann	5	Brennen Elementary	Kathy Cox	Botany
Elliott Chartock	7	Crayton Middle	Betsy Scarborough	Medicine and Health
Eric Bykowsky	6	Crossroads Middle	Carri Tucker	Behavioral & Social Sciences
Roid Elmore	6	Crossroads Middle	Virginia Nelson	Physics
Ryan Pittman	6	Crossroads Middle		
Emily Theus	8	Dent Middle	Susan Yelton	Chemistry
Michael Hobensack	8	Dent Middle		Environmental Sciences
Emily Bakaj	8	Dent Middle		Microbiology
Taylor Brazell	8	Dent Middle		Zoology
Hudson Tryon	8	Dent Middle		Environmental Sciences
Kenan Sakarcan	8	Dent Middle		Medicine and Health
Senna Desjardins	8	Dent Middle		Medicine and Health
Elizabeth Basnight	8	Dent Middle	Marriah Schwallier	Physics
Anjali Bergren	8	Dent Middle		Mathematics
Brandi Hallman	8	Furman Middle	Karen Laverdiere	Environmental Sciences
Nicole Berabo	8	Hammond	Laura Thomas	Engineering
Brian Sturm Zachary Hodges	8	Hand Middle	Brenda Ponsard	Zoology
Gina Hansen Erin O'Loughlin	7	Hillcrest Middle	Romona Stogner	Behavioral & Social Sciences
Taylor Malone	6	Hopkins Middle	Tiffany Scott	Physics
Kierra Young Jhanelly Garcia	5	Logan Elementary	Amy Umberger	Medicine and Health
Nelson Gibbons Mary Baker	7	Manning Junior High	Tiffany Lemon	Zoology
Noah Zimmermann	5	St. Joseph Catholic	Frances Goodrich	Earth and Space Sciences
Madysun Adkins	8	Summit Parkway Middle	Jane Perry	Behavioral & Social Sciences
Sarah Livingston	8		Sandra Nuelken	Behavioral & Social Sciences
Caitlyn Ross	8	Thomas Sumter Academy	James Monnett	Earth and Space Sciences
Nicholas Johnson Raymond Fox	5	Webber Elementary	Alicia Lyles	Zoology

Certified Metrication Specialist (CMS) Program

The USMA CMS Program is designed to provide documentary evidence for individuals who can qualify as metric specialists because of their education and experience in the use of the modernized metric system—known as SI (*système international d'unités*).

The CMS program is structured to help maintain professional standards in the field of metrication. With the United States' conversion to SI, companies, schools, agencies, businesses, and other facilities will seek personnel who, in addition to their job skills, are knowledgeable about SI. The USMA CMS Program is designed to give both employers and employees the documented evidence that an individual's qualifications have been carefully screened to verify that he or she has the background and ability to use the SI version of the metric system correctly.

The South Carolina version of the CMS Program encourages each school superintendent in the state to recommend one person from his/her district to be certified. Ideally we want each of 1,945 schools in the state to employ a certified metric specialist.

Outline for South Carolina Educators - CMS

South Carolina applicants follow these procedures:

1. Obtain information (including a CMS packet) about the CMS Program
2. Fill out application form and include as references
 - a. Immediate Supervisor
 - b. School District Superintendent
 - c. USMA Eastern Director, Don Jordan
3. List courses taught, number of years of teaching experience, and at what levels (elementary, middle, high school, post-secondary)
4. Make arrangements to take CMS Exam (80% is passing score)
 - a. By appointment
 - b. At SCAS/SCJAS Annual Meeting site
 - c. At SCSC
 - d. SCCTM Annual Meeting
 - e. Other

You may schedule your exam at any one of several sites across the state. See address at bottom of page.
5. Checks should be made payable to **USMA CMS Program**. A discounted fee (\$25.00) can be paid at the time of the exam. (Note: Regular fee is \$65.00).

CMS Exam results are confidential.

Names of successful candidates will be added to all USMA lists and, for SC educators, names will be published in both the SCJAS Newsletter and the SCAS Newsletter. Names will also be forwarded to the State Department of Education, the Commission on Higher Education, and the United States Department of Commerce.

Note: The CMS/CAMS Certification Program is an educational project that has the support of the State Department of Education and the following organizations.

SCSC	South Carolina Science Council	SCAS	South Carolina Academy of Science
SCJAS	South Carolina Junior Academy of Science	SCCTM	South Carolina 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

Sherry Bailey (301) Spring Valley High School	James Frysinger (323) Charleston SC 29407	Frances P. Dantzler (343) Lexington Middle School
Marcia Burckhalter (302) Barnwell High School	Ms. Hema Patel (324) Orangeburg-Wilkinson H.S.	Ruth S. Glowacki (344) Rosewood Elementary
Barbara Gardner (303) Wade Hampton High School	Ms. Rosemary Wicker (325) Upper Sav. M & S Hub	Jeanne S. Hartley (345) Lexington Middle School
Larry Mason (304) Union High School	Dean Cannavan (326) Aiken SC 29803	P. L. Hutchenson (346) North Springs Elementary
Clarice Wenz (305) Goose Creek High School	Tom Partridge (327) Summerville SC 29485	Virginia Q. Lacy (347) North Springs Elementary
Linda Sinclair (306) St. Dept. of Ed. Sci. Council	Zeddie Boyd (328) Harleyville SC 29448	Gretta Nelson (348) Lexington Middle School
Rosalyn Porter (307) S. Aiken High School	Martha Lee Boswell (329) Manning High School	Rebecca B. Pugh (349) Mid-Carolina Middle School
Richard Porter (308) Cainhoy High School	Linda Fuller Brown (330) Caughman Rd. Elementary	Gwen Sasiene (350) Columbia SC 29223
David C. Keller (309) McCormick High School	Helen R. Ellis (331) Manning Primary School	Nancy Taylor (351) Crosswell Drive Elementary
Robert I. McDonald (310) Timmonsville High School	Paige D. Graham (332) Garmany School	Audrey A. Andrieski (352) North Springs Elementary
Stephen T. Ravan (311) Crescent High School	Janet M. Hayden (333) Batesburg-Leesville Middle	Judy W. Dew (353) Johnakin Middle School
Edna S. Mills (312) Merriwether Elementary	Ben A. Wadsworth (334) Addlestone Hebrew Acad.	Carolyn H. Cromer (354) Anderson SC 29621
John L. Kinard (313) Greenwood High School	Venie Spencer (335) Caughman Rd. Elementary	Sharon C. Coates (355) Columbia SC 29205
James D. Angel (314) Palmetto High School	Dawn P. Allen (336) Holy Hill Primary School	Margaret S. Creech (356) Greenville SC 29607
Johnny Davis (315) Georgetown School District	Margaret Ann Paul-Cochran (337) S. Kilborne Elementary	Cindy Gardner (357) Lexington SC 29072
Christine Randolph (317) Calhoun County H.S.	Angela Blair (338) John Ford Middle School	Sheryl Pitts (358) Anderson SC 29621
Arlene B. Johnson (319) Mullins High School	Melissa Woodard (339) Kingstree SC 29556	Leslie Sanford (359) Greenwood SC 29649
Istvan Hajdu (320) Blackville-Hilda High School	Sharon L. Valentine (340) Ashland KY 41101	Susan H. Young (360) Norway SC 29113
Louisa R. Fleming (321) Liberty High School	Diana Z. Stafford (341) Christ Church Episcopal	Camille Hiott (361) Manning SC 29102
Ron Harsha (322) Whitmire SC 29178	Kimberly J. Carter (342) McCoyre-Liston Elementary	Lillian R. Potter-Arnold (362) Columbia SC 29223

Caroline Gadson (363) Branchville SC 29432	James Bailey (379) McCormick High School	Michael J. Kramer (393) Batesburg Leesville
Richard Hager (364) Ridgeview High School	Kathey D. Mays (380) Newberry High School	Heather E. Nix (394) Airport High School
Tina Webb (365) Hilton Head High School	Howard Pierce (381) Clinton Elementary	Delbill O. Calalo (395) Fairfield Central High School
Joe Mitchener (366) Edenton NC 27932	Janice Murray-Gamble (382) Williamsburg County School	Cynthia Graybill (396) Lexington SC 29073
Dianne Earle (367) Moore SC 29369	Robert Schiferl (383) Columbia SC 29212	Jonathan Dailey (397) Newberry College
John Pugh (368) Prosperity SC 29127	John Daniel Wicker (384) Newberry College	Esther E. Etokitiot (398) Midlands Math & Business Acad.
John Romansky (370) Anderson SC 29625	Massimo Malossini (385) Waccamaw High School	Floyd W. Dinkins (399) Taylor Elementary
Mark Musselman (371) Alston Middle School	Deidre Culbreth (386) Greenwood SC 29646	Christina Pegues (400) Summit Parkway Middle
Sondra Wieland (372) Heathwood Hall Episcopal	Shanise N. Brown (387) Hand Middle School	Kendrick Kerr (401) Pine Ridge Middle School
Loretta A. Denko (373) Barnwell SC 29812	Linda Jackson (388) Caughman Rd. Elementary	Carrie Simpson (402) W.A. Perry Middle School
Jody Penland (374) Laurens SC 29360	Bobbi Sue WRenn (389) Southeast Middle School	Jane Perry (403) Summit Parkway Middle
Catherine Lyrick (375) Lake Wylie SC 29710	Kimrey Smith (390) St. Andrews Middle School	Natalia Comsa (404) Kelly Mill Middle School
H. Blackowicz (376) Andrews SC 29510	Roger Skillman (391) Anderson County Alternative School	Barabara Soblo (405) E. L. Wright Middle School
Dawn Pursley (377) Rock Hill SC 29732	Randolph Brooks (392) Dreher High School	Tammy M. Howell (406) White Knoll High School
Anita Husbands (378) Newberry High School		

MANUAL OF PROCEDURES

South Carolina Academy of Science

A Handbook for Officers and Committee Chairs

Compiled and Edited by

Jack A. Turner - 1982 Gordon Sproul - 1991 John D Bernard – 1996
David J. Stroup - 1998, 2001

INTRODUCTION

This Manual is intended to serve as a guide for officers, committee chairs, and committee members of the South Carolina Academy of Science and to aid them in the performance of their duties. The Secretary of the Academy should maintain and distribute a copy of the Manual to new Council members. Except as directed in the Constitution and Bylaws, the policies and procedures described are not intended to be rigidly followed. Although current customs and present and past purposes are emphasized, new ideas and directions in operations should be encouraged. Officers and committee chairpersons should seek creatively to improve and develop the functions and programs of the Academy to meet the changing needs of South Carolina and the scientific community.

Development of this manual was first begun in the late 1960's when officers and committee chairs submitted descriptions of their duties as they saw them. These materials have been updated and edited at intervals. Jack A. Turner edited a copy of the Manual in 1982. Gordon Sproul updated and recompiled the Manual in 1991 and moved the Manual to electronic form. John D. Bernard sent out surveys to Council members in 1994-1995 and updated the Manual in 1996, also moving the electronic form to an electronic desktop published version. This manual was revised by David J. Stroup and the 70th and 71st Councils of the SCAS. This narrative includes statements of general policies and procedures approved by the Council, with organizational descriptions, and with the Constitution and Bylaws (revised 1997). The varying styles of the descriptions reflect their authorship, although the editors have attempted to create a unified presentation using modern phraseology.

This manual includes a rearranged order of topics as well as several new job and standing committee descriptions. Because it is now stored in IBM compatible software, it can be readily updated when changes are desired; this should encourage frequent updating of the materials.

TABLE OF CONTENTS

(Page numbers have been deleted to facilitate publication in a condensed format for the SCAS Bulletin)

Section	
I.	Constitution and Bylaws
II.	Membership
III.	Council
IV.	General Policies and Procedures
V.	Job Descriptions: Council Officers
	President
	President-Elect
	Secretary
	Treasurer
	Vice-President
VI	Job Descriptions: Councilors
	Bulletin Editor
	Executive Director of SCJAS
	Immediate Past President
	Newsletter Editor
	Past President
	Executive Director of S.C. MESAS
VII.	Job Descriptions: Appointees
	Curator
	NAAS Representative
	Representative to the South Carolina Research Authority Advisory Board
VIII.	Standing Committees
	Bulletin Advisory Committee
	Governor's Award for Excellence in Science Committee

High School Research Awards Committee
 Long Range Planning Committee
 Membership Committee
 Necrology Committee
 Newsletter Advisory Committee
 Nominations and Elections Committee
 Patron Membership Committee
 Program Committee
 Publicity Committee
 Resolutions Committee
 Science Fairs Committee
 Science Week Committee
 Secondary Science or Math Teacher of the Year
 Selection Committee
 Undergraduate Research Awards Committee
 Two Year College Committee

I. CONSTITUTION AND BYLAWS OF THE SOUTH CAROLINA ACADEMY OF SCIENCE
 (Revised April 6, 2001, March 10, 2006, and April 20, 2007)

ARTICLE I. NAME AND OBJECT

Section 1. The name of this organization shall be the South Carolina Academy of Science.

Section 2. The objective of the Academy shall be to promote the advancement and constructive use of science in South Carolina by: (a) encouraging the association of scientifically oriented people to bring their talents to bear usefully on public policy, (b) providing means to facilitate the work of scientists and to promote cooperation among them, (c) improving the teaching and appreciation of science in schools at all levels, and (d) working to improve the public understanding and appreciation of science.

Section 3. In the event of dissolution, the residual assets of this organization will be turned over to another organization which is itself exempt from Federal Income Tax as an organization described in Section 501(C)(3) of the Internal Revenue Code, or to the Federal, State or Local Government.

ARTICLE II. MEMBERSHIP AND DUES

Section 1. The membership shall be of nine (9) classes: regular, student, contributing, joint, life, patron, honorary, distinguished, and emeritus.

Section 2. Any person(s) actively interested in science or the promotion of science may be elected to membership in the Academy by a majority vote of Council. Also, by a majority vote of the Council an institution or organization may be elected as a patron of the Academy.

Section 3. There shall be no initiation fee. Dues shall be paid in the amount provided in the Bylaws.

ARTICLE III. OFFICERS AND COUNCIL

Section 1. The officers of the Academy shall be a President, a President-Elect, a Vice-President, a Secretary, a Treasurer, and twelve Councilors.

Section 2. The officers named in Section 1, together with the two Immediate Past Presidents, shall constitute the Council in which the governance of the Academy shall be vested. The Bulletin Editor, the Newsletter Editor, the Webmaster, a representative of the South Carolina Science Council, the Director of the Middle/Elementary School Academy of Science, and the Executive Director of the South Carolina Junior Academy of Science shall be ex-officio members of the Council.

Section 3. The Vice-President shall be elected annually and shall succeed to the office of President-Elect. Councilors shall be elected for three-year terms, staggered so that four Councilors are elected annually. The Secretary and the Treasurer shall be elected for three year terms, with re-election for additional terms encouraged.

Section 4. The officers shall perform the duties of their respective offices under the direction of the Council. The term of office shall commence on July 1st following the annual meeting at which the elections are held and shall continue until successors are qualified.

Section 5. A vacancy occurring in any office in the interim between annual business meetings shall be filled by election by the Council.

ARTICLE IV. REPOSITORY AND CURATOR

Section 1. The library of the University of South Carolina at Columbia is hereby designated as a repository for such books, bulletins, journals or other matters of permanent record or interest as may come into the possession of the Academy by gifts or otherwise.

Section 2. The Council shall designate annually a member of the Academy, situated at the University of South Carolina, to be the Curator of such deposited material.

ARTICLE V. PUBLICATIONS

Section 1. The Council shall cause to be published annually a volume of proceedings as a permanent record of the activities of the Academy. Such publication shall be the responsibility of the Bulletin Committee. The President is hereby authorized to appoint, with the approval of the Council, three members to the Bulletin Committee, one of whom shall be designated as Editor. The terms of office shall be one year. In addition, the Webmaster, and the Secretary shall be ex-officio members but shall not serve as Editor.

Section 2. The Council shall cause to be published quarterly a Newsletter. Such publication shall be the responsibility of the Newsletter Committee. The President is hereby authorized to appoint, with the approval of the Council, three members to the Newsletter Committee, one of whom shall be designated as Editor. The terms of office shall be one year. In addition, the Webmaster, and the Secretary shall be ex-officio members but shall not serve as Editor.

ARTICLE VI. MEETINGS

Section 1. There shall be an annual meeting for the presentation and discussion of papers and for the transaction of business. The annual meeting shall be held at a time and place determined by the Council.

Section 2. The program for the scientific sessions at the annual meeting shall be prepared by a Program Committee appointed and chaired by the President-Elect.

Section 3. At the annual meeting a specified hour shall be set aside for the annual business meeting.

ARTICLE VII. JUNIOR ACADEMY

Section 1. The South Carolina Junior Academy of Science (Junior Academy) shall be a subsidiary organization of the Academy. The Academy shall assist the Junior Academy in providing activities which encourage an interest in science among secondary students in South Carolina.

Section 2. The Executive Director of the Junior Academy shall be an ex-officio member of the Council of the Academy. The Executive Director shall be nominated by the Board of Directors of the Junior Academy and shall be appointed by the Council of the Academy.

Section 3. The affairs of the Junior Academy shall be governed by a Board of Directors, which includes teachers and students and other interested persons, as specified by the Bylaws of the Junior Academy. These Bylaws shall be devised by the Board of Directors of the Junior Academy, and shall be ratified by the Council of the Academy.

ARTICLE VIII. MIDDLE SCHOOL ACADEMY

Section 1. The South Carolina Middle School Academy of Science (Middle School Academy) shall be a subsidiary organization of the Academy. The Academy shall assist the Middle School Academy in providing activities which encourage an interest in science among pre-secondary students.

Section 2. The Executive Director of the Middle School Academy shall be an ex-officio member of the Council of the Academy. The Executive Director shall be appointed by the Council of the Academy.

Section 3. The affairs of the Middle School Academy shall be governed by a Board of Directors which includes teachers and students and other interested persons, as specified by the Bylaws of the Middle School Academy. These Bylaws shall be devised by the Board of Directors of the Middle School Academy, and shall be ratified by the Council of the Academy.

ARTICLE IX. WESTERN UPSTATE REGIONAL SCIENCE FAIR

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

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

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

ARTICLE X. MIDLANDS REGIONAL SCIENCE FAIR

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

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

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

ARTICLE XI. AMENDMENTS

Section 1. This constitution may be amended only by two-thirds vote of those present at an annual meeting, provided that such proposed amendment be submitted in writing to the Council, and by it promulgated to the membership with its recommendation, at least two weeks before the annual meeting.

BYLAWS

1. Applications for membership (other than honorary, distinguished, and emeritus) may be made at any time to any member of Council provided that each application be accompanied by payment of dues for one year.
2. Membership dues shall be as follows: (a) Regular membership dues shall be twenty-five dollars per year, except for teachers of grades 12 or lower who shall pay one-half times the regular rates; (b) Student membership dues shall be one-half times the regular membership dues; (c) Joint (spouse) membership dues shall be one and one-half times the regular membership dues; (d) Life membership dues shall be fifteen (15) times the dues for a regular member, payable over not more than three years, after which no further dues will be asked; (e) Patron membership dues shall be determined by Council; and (f) Emeritus, Distinguished, and Honorary memberships shall have no dues.
3. Membership dues are due and payable on the first day of January each year. Those dues determined from the regular member dues rate will always be rounded down (when necessary) to the nearest integer dollar amount. Members in arrears shall neither participate in the deliberations of the Academy nor shall receive the Bulletin, and shall be dropped from the roll when they are two years in arrears (student members shall be dropped after one year), provided they have been notified annually of their delinquency.
4. Emeritus membership shall be available for those retired members who either have held membership in SCAS for at least ten years and who request such status from the Secretary or have been recommended for such status by Council.
5. A membership card shall be provided to each member. Each member shall also receive the Newsletter and the Bulletin, except in the case of joint members who will together receive one copy of each publication.
6. The program for the scientific sessions of the annual meeting shall be published in the Newsletter before the meeting. No paper shall be placed on the program unless it shall have been approved by the Program Committee and unless it shall have been accompanied by an abstract in proper form for publication. The presenter or the senior author, whichever may be preferred by the authors, must be a member in good standing. The Secretary shall issue a call for papers in ample time to make the preparation and publication of the program possible.
7. Nothing in these Bylaws shall be interpreted as preventing the participation of non-members in the scientific session, upon the invitation of the Program Committee.
8. At the annual business meeting, the following order of business shall prevail: (1) Minutes of the previous meeting; (2) Minutes of the Council; (3) Reports of officers (President, Secretary, Treasurer, Curator, Editor); (4) Reports of Committees; (5) Unfinished Business; (6) New Business; and (7) Election of officers.
9. In the interim between annual business meetings, Council shall meet at least quarterly, at the call of the President. Two weeks notice shall be given and those present shall constitute a quorum for the transaction of business, provided that at least three members of the Council be present.
10. These Bylaws may be amended at any annual meeting by two-thirds vote of all members present. Such amendments may be submitted to the Council, or proposed from the floor as new business.

END OF CONSTITUTION AND BYLAWS

II. MEMBERSHIP

- A. A list of members in the Bulletin shall be in nine groups: regular, joint, student, contributing, life, emeritus and honorary, patron, distinguished.
 1. The major fields of interest of the members shall be shown by an appropriate symbol placed at the end of the line in the list in the Bulletin.
 2. Designated representatives of patron members shall be listed with the patrons they represent. They shall receive for their patrons all mailings from the Academy and shall as representatives of their patrons have all rights and privileges of membership.
- B. Emeritus Membership.
 1. Emeritus membership may be conferred on members who meet these requirements:
 - a. are members in good standing for at least ten (10) years.

- b. have retired from their regular jobs through age, illness or other reasons.
 - c. have belonged to the Academy for a considerable number of years.
 - d. have significantly and unselfishly contributed to the work of the Academy.
 - 2. Emeritus members shall be elected by the Council.
 - 3. Emeritus members shall have all privileges and prerogatives of regular members but shall not be asked to pay dues.
- C. Distinguished Membership.
 - 1. Distinguished membership may be conferred on members who meet these requirements:
 - a. are members in good standing.
 - b. have a long term tenure of service to the Academy.
 - c. have belonged to the Academy for a considerable number of years.
 - d. have significantly and unselfishly contributed to the work of the Academy.
 - 2. Distinguished members shall be elected by the Council.
 - 3. Distinguished members shall have all privileges and prerogatives of regular members but shall not be asked to pay dues.
- D. Honorary Membership:
 - 1. Honorary members shall be elected by the Council.
 - 2. Honorary members shall have all privileges and prerogatives of regular members but shall not be asked to pay dues.
- E. Contributing, life, regular, joint and patron members shall be dropped from the rolls at the beginning of their third year of dues delinquency. Student members shall be dropped in their second year of dues delinquency.
- F. Only members in good standing shall receive the Bulletin. If a member pays dues for the current year at a late date, that member shall receive a copy of the latest Bulletin only.

III. COUNCIL

The Council is the governing body of the Academy and upon it rests the responsibility of establishing and changing policies and planning programs and activities for the Academy. The Council's voting membership consists of the following persons:

Elected (and therefore "Officers" of SCAS):

- President, President-Elect, Vice-President (1-year terms)
- Secretary and Treasurer (3-year terms)
- Twelve Councilors (3-year terms, staggered)

Designated:

- Immediate Past President (1-year term)
- Past President (1-year term)
- Bulletin Editor (1-year term)
- Executive Director of the S. C. Junior Academy
- Newsletter Editor (1-year term)
- Executive Director of MESAS

The Immediate Past President serves for one year following a term of office as President, and then for a year as Past President before leaving Council. The custom has also been for editors and the NAAS representative to serve for a period of years.

Others who are encouraged to attend Council meetings include:

- Curator (1-year term)
- NAAS Representative (3-year term)
- Representative from the S. C. Department of Education
- Representative from the S. C. Science Council
- Representative of the S.C. Association of Chemistry Teachers
- Representative of the S. C. Association of Biology Teachers
- Representative of the S.C. Council of Teachers of Mathematics

Quarterly Council Meetings are scheduled and are usually held in Columbia because of its central location. These meetings occur in late July, October, January, and immediately prior to the Annual Meeting.

Chairs of the various Standing Committees are appointed by the President and serve one-year terms. They are generally selected from among the Council members and are often re-appointed to provide needed continuity.

IV. GENERAL POLICIES AND PROCEDURES

(See also appropriate material under Job Descriptions of the various positions and under Standing Committees.) The Academy seeks to implement its objectives (see Article I, Section 2 of the Constitution) in the following manner:

- a. by conducting an Annual Meeting for the presentation and discussion of timely topics and papers involving current research throughout the scientific community in the state.
 - b. by publication of a quarterly Newsletter that describes the actions of Council, promotes the organization, and describes items of interest to the general membership.
 - c. by publication and distribution of abstracts of the papers presented at the Annual Meeting in its Bulletin.
 - d. by sponsoring the Middle and Elementary Academy of Science.
 - e. by sponsoring the Junior Academy of Science in the schools of the state which meets annually in conjunction with the parent organization and which affords such students an opportunity to present papers and hear papers in a scientific atmosphere.
 - f. by having an appointed member to represent the Academy in the American Association for the Advancement of Science.
1. The President-Elect shall serve as chairperson of the Program Committee and should have complete charge of the program, including selection of papers, invitation of speakers, physical arrangements, etc.
 2. Although the Constitution does not specify the date of the Annual Meeting, it should be held near the beginning of April; late April dates conflict with other meetings and end-of-school activities, while dates in March force a too-early deadline for Abstracts.
 3. The place of Annual Meetings should rotate among central and more peripheral locations, generally at the President-Elect's home institution.
 4. The Newsletter editor shall have the programs printed and mailed to members in the February Newsletter. The program chairperson should cooperate in this effort, assembling the program and proofreading it.
 5. The Newsletter editor should issue a Call for Papers for the program in the fall Newsletter (September). An Abstract Form provided by the program chairman should be included in the Call for Papers.
 6. With the exception of invited papers, the presenter or senior author of any paper presented at the Annual Meeting, whichever may be preferred by the authors, shall be a member in good standing, and all residents of South Carolina who appear on the program should be members of the Academy. In practice, papers are accepted for the program when appropriate applications for membership, accompanied by the payment of dues, are received.
 7. Authors of invited papers need not be members.
 8. Appropriate Academy awards shall be made or announced at the Awards Program in conjunction with the Annual Meeting. When finances permit, an awards banquet may be scheduled at the Annual Meeting.
 9. All reports of committees at the Annual Meeting or elsewhere shall be submitted in writing. Annual reports of all standing committees shall be printed in the Bulletin either as parts of the minutes or otherwise. Reports of ad hoc committees shall be printed where appropriate.
 10. With the approval of Council, travel expenses and honoraria may be made available to the Program Committee for invited speakers. It is preferable, however, that the Annual Meeting be self-sustaining.
 11. The Academy shall make available a sum of money to the NAAS Representatives to help defray travel expenses incurred in attending the Annual Meeting of the NAAS.
 12. The President shall serve as Chairperson of the Long Range Planning Committee. This Committee typically meets immediately prior to each quarterly Council Meeting. It is concerned with the growth and direction of the Academy.

V. JOB DESCRIPTIONS: COUNCIL OFFICERS

PRESIDENT

1. The President is the chief administrative officer of the Academy, as well as its ceremonial head, and should be concerned with all of its affairs during the year. The President should work especially closely with the Secretary, Treasurer, Editors, and the President-Elect. The President also should work with or be informed of all programs of the Academy and as Chair of the Long Range Planning Committee, assist in the development of new programs for the Academy and any changes in its operation.
2. The President is one of the constitutionally designated officers of the Academy, and with the other elected officers begins a one-year term of office on July 1, following the Annual Meeting. Transferal of materials and laying of plans for the coming year should be completed by that time.
3. The President should appoint as soon as possible, with the approval of the Council, the Editor and two other members to both the Bulletin and the Newsletter Committees, for one-year terms of office.
4. A Representative to the National Association of Academies of Science is appointed triennially by the President, with the approval of the Council, from the members of the Academy who are concurrently Fellows of NAAS. Thus, this appointment is normally to be made every third year and will not be the responsibility of every President.
5. The President must appoint a Chairperson and members of each standing committee of the Academy, described elsewhere in this manual, as well as representatives from SCAS to certain organizations. These

are appointed annually except for the chairperson of the Patron Membership Committee, the NAAS Representative, and the Representative to South Carolina Research Authority Advisory Board who are appointed for three-year periods, respectively, and the members of the Long Range Planning Committee who are the officers of the Council. These appointments, as well as those of Newsletter and of Bulletin Editor, NAAS Representative, and Patron Membership Chairperson when needed, should be made early—preferably before the summer begins. All committee and chairpersons appointments should be cleared with the appointees insofar as is practical. The President may wish to ask the chairperson to suggest some or all the persons to serve with them.

6. The President may appoint officers to oversee certain groups of committees in order to provide better communication. It is recommended that the Vice President oversee the Membership, Patron Membership, and Publicity Committees in order to become familiar with their workings to more effectively serve as Program Chairman for the Annual Meeting.
7. The President must appoint those ad hoc committees initiated during the current term of office, make appointments to any other non-standing committees for which they may be needed, and act under the instructions of the Council with regard to any other appointment matters.
8. The President must see that the Council annually designates a Curator (see duties of the Curator).
9. If necessary, the President must instruct the committee chairpersons in the functions of their committees, and indicate procedures, deadlines, etc.
10. The President must call quarterly Council Meetings to work on programs and plans for the year.
11. The President must preside at meetings of the Council, at the various general meetings during the Annual Meeting, and at the Annual Business Meeting of the Academy.
12. The President should prepare an Agenda for each Council Meeting, which should be distributed, with supporting information, to Council members and other interested parties at least one week in advance of the meeting.
13. Although it is the duty of the Council to set the time and place of the Annual Meeting, the President should see that this is done as early as possible. Preferably, the place for the Annual Meeting should be decided a year ahead of time and announced at the preceding Annual Meeting.
14. Where Council approval is required for action, the President may poll its members by mail or electronic means, if that seems more practical than calling a special meeting or waiting until the next regular meeting.
15. The President should see that all officers and chairmen of standing committees have a copy of this Manual of Procedures (which they should return to the Secretary when they leave office). The President should arrange to have the Manual revised as necessary. See also the Secretary's responsibility in this regard.
16. The President must make an annual report to the Academy to be published in the Bulletin.
17. The President is to perform all other functions appropriate to the office.

PRESIDENT-ELECT

The President-Elect serves for one year preceding service as President.

The President-Elect attends Council meetings as an officer of the Academy. Responsibilities of the President-Elect include service as Chair of the Program Committee, appointment of chairs for the various sections of the Annual Meeting, receipt of abstracts of papers for the program, providing for the listing of the abstracts in the Newsletter and the Bulletin, setting the time of the Annual Meeting with approval of the Council, making arrangements for invited speakers and all physical facilities and providing overall coordination of the Annual Meeting program. See Program Committee in the Standing Committees section.

SECRETARY

The Secretary is elected to a three-year term and may be reelected. The Secretary has these responsibilities:

1. To serve as a member of the Council of the South Carolina Academy of Science and to attend all Council meetings.
2. To keep the minutes of each Council meeting and of the Annual Business Meeting of the Academy and to send to each Council member a copy of the minutes of the most recent meeting with the announcement of the next Council meeting.
3. To receive from the President annual reports of the committees and officers of the Academy and maintain them in an appropriate file.
4. To insure that every Council member has a current copy of the Manual of Procedures.
5. To maintain and preserve the official Academy files and to retain as yearly units the files for a period of six years preceding the then current year. After the files of the Academy have been in the hands of the Secretary for six years they are then given to the Curator for permanent filing.
6. To serve as an ex-officio member of the Bulletin and Newsletter Committees.
7. To apprise the President and any other officers of the Academy of any materials received which pertain to the duties of these officers.

8. To see that an adequate supply of letterhead Academy stationery is available each year.
9. To work with the Newsletter Editor to ensure that the membership is apprised of Council action.
10. To oversee the proper functioning of the several standing committees relating to publications: Bulletin, Newsletter and Resolutions.
11. To send letters of appreciation that have been approved from the Resolution Committee at the Annual Business Meeting.

TREASURER

The Treasurer is elected to a three-year term and may serve more than one term. The Treasurer has the responsibility:

1. To serve as a member of the Council of the South Carolina Academy of Sciences and to attend all Council meetings.
2. To receive and disburse all monies of the Academy and to keep appropriate records thereof.
3. To prepare the official list of current members of the Academy for the Bulletin.
4. To provide up-to-date sets of mailing labels for the Newsletter and other mailings.
5. To provide the Secretary and committee chairs with a list of current members upon request.
6. To provide special notification of renewal of membership to Patron Members.
7. To contact AAAS annually to determine the total Senior Academy monies available for the AAAS research awards and to notify the Executive Director of the SCJAS and the committee responsible for these awards.
8. To keep in correspondence with the Awards Committee to assist them with the monies needed.
9. To submit a written financial report to the President at the time of the Annual Meeting.
10. To set up a registration table for the Annual Meeting, with the help of the local Arrangements Committee, and to keep a record of attendance.
11. In consultation with the President, have the books audited each year. A written report should be submitted to Council.
12. To invoice the respective Sigma Xi chapters during the summer to procure funds for the various research awards.
13. To prepare a proposed annual budget for presentation at the summer meeting.

VICE-PRESIDENT

This officer shall serve as a member of the Council of the Academy and shall assume the duties and responsibilities of the President in his absence from meetings of the Academy or if the President is not able to fulfill the duties and responsibilities of the office.

Acting on behalf of and responsible to the President and Council of the Academy, the Vice-President shall be primarily concerned with the growth and development of the Academy. In particular the Vice-President shall be an ex-officio member of the Publicity and Membership Committees.

The term of office of the Vice-President is one year. Upon completion of the term in office the Vice-President shall succeed to the office of President-Elect.

The Vice-President should oversee the proper functioning of the several standing committees relating to science affairs: Membership, Necrology, Nominations, Patron Membership, Publicity, and Science Week.

VI. JOB DESCRIPTION: COUNCILORS

The Council consists of the President, the Vice-President, the President-Elect, the Secretary, the Treasurer, and twelve Councilors (four of whom are elected each year for a three-year term). The Immediate Past President and Past President also serve on the Council. The Bulletin Editor, Newsletter Editor, Executive Director of SC MESAS and Executive Director of the South Carolina Junior Academy of Science serve as ex-officio members of the Council. All members have similar responsibilities, which are:

1. To give careful consideration to all matters brought before the Council;
2. To bring ideas concerning the Academy before the Council; and
3. To cooperate and assist in the implementation of Council decisions.

BULLETIN EDITOR

The Bulletin Editor is designated annually by the Council. The Editor has the responsibility of preparing, publishing and delivering the Bulletin. He/she must collect materials from Council members, edit these, have them typed, printed, bound and mailed. See Bulletin Committee for contents of the Bulletin.

EXECUTIVE DIRECTOR OF THE SCJAS

The Executive Director of SCJAS

1. Serves as Chairman of the High School Relations Committee. The Director prepares the agenda for this committee and serves as an ex-officio member of the Council of SCAS, representing the Junior Academy.
2. Appoints two Adult Directors of the Junior Academy each year — with the approval of the SCAS President and the High School Relations Committee — and keeps in contact with all Adult Directors to ensure that they carry out their duties. The Executive Director may appoint additional Student Directors each year to assist with duties.
3. Is responsible for the finances (such as from SCAS, outside grants, and private gifts) of the Junior Academy.
4. Maintains the database for SCJAS clubs and does necessary correspondence for the day-to-day operation of the Annual Meeting of SCJAS.
5. Directs all programs for the Junior Academy or appoints an appropriate person to act in his place.
6. Appoints an Editor of the SCJAS Newsletter and should maintain a professional quality of that publication. The Editor edits, prints, and distributes Newsletters to all individual members, officers, SCAS Council members, and those in leadership roles in the Junior Academy. These Newsletters will be mailed in August/September, November/December, February/March, and April/May. The August/September edition shall include application information and Fall Workshop details. The November/December edition shall include Winter Workshop details, results from the Fall Workshop, AAAS research grant information, a Call for Papers for the Spring Annual Meeting, etc. The February/March edition shall include specific details of the spring Annual Meeting and registration instructions for the meeting. The April/May edition shall include awards and results of the annual meeting. The Executive Director will review and approve each Newsletter edition.
7. Appoints an Adult Treasurer to work alongside the elected SCJAS student Treasurer. The Treasurer will be responsible for collecting all dues, paying all bills, preparing the annual financial report, keeping an updated database of the membership and providing the officers of SCJAS with mailing labels.
8. Serves as a Trustee of the SCAS/SCJAS Trust Fund along with the Immediate Past SCJAS Executive Director, the President of SCAS, the Immediate Past President of SCAS, the Treasurer of SCAS, one SCJAS Sponsor, and the Senior Trust Officer of First Citizens Bank. John Michener — the Founder of SCJAS — will serve as ex-officio Trustee.
9. Presides jointly with the Student President at all meetings of the Board of Directors. There are normally three called meetings of the Board each year.
10. Works closely with the Secretary of SCAS in planning the Junior Academy activities, especially the Annual Meeting.

IMMEDIATE PAST PRESIDENT

The Immediate Past President should alternate with the Past President in overseeing the proper functioning of either the standing committees on secondary school relations or the standing committees on awards. The standing committees concerned with awards include the following committees: Governor's Awards, High School Research, Outstanding Secondary Science Teacher, Research Paper, Explorers, and other awards.

NEWSLETTER EDITOR

The Editor has the responsibility of supervising the layouts, typesetting, printing, publication and mailing of the Newsletter. The Editor must solicit articles from Council members, write feature articles and editorials, edit news items and submitted articles and prepare announcements for each issue. The Editor may be assisted in these tasks by an assistant or associate editor.

The Newsletter Editor should annually set deadlines for submission of articles for inclusion in the four annual editions of the Newsletter. Normally these four editions will be published in August/September, November/December, March and June/July. The August/September issue is sent not only to members but also is widely disseminated within the state. It should include an initial Call for Papers. The November/December issue should include the formal Call for Papers. The March edition should include details of the Annual Meeting, nominations of offices, and any proposed Constitutional or Bylaws changes. The June/July edition should recognize the award winners for the several awards made by the Academy.

PAST PRESIDENT

The Past President should alternate with the Immediate Past President in overseeing the proper functioning of either the standing committees on awards or the standing committees on secondary school relations. Standing

committees relating to secondary school relations involves the following committees: AAAS Research Grant, High School Relations, Science Fairs, and NAAS Representative.

EXECUTIVE DIRECTOR OF S.C. MESAS

- 1.
- 2.
- 3.

VII. JOB DESCRIPTION: APPOINTEES

CURATOR

The Curator is designated annually by the Council and must be a member of the Academy and situated at the University of South Carolina at Columbia. This person has custody over the repository of Academy materials located there (see Article IV of the Constitution).

It has been the duty of the Curator to report annually the issuance of copies of the Bulletin to other Academies of Science and institutions in the United States and foreign countries and the receipt of exchange copies of publications and these sources.

It is the duty of the Curator to oversee the permanent disposition of Academy materials and the placing of those items deemed worthy in the USC Library.

The Curator and the SCAS President must contact all committee chairmen one month prior to each Annual Meeting and request that copies of all correspondence and documents with historic value be received on or before the date of the Annual Meeting.

Although the appointment has been annual it has been the custom for the Curator to serve a number of years.

NAAS REPRESENTATIVE

(Representative to the National Association of Academies of Science from the South Carolina Academy of Science)

The NAAS Representative is appointed by Council. The principal duty is to represent the Academy at meetings of the NAAS. Reports of Council Meetings of NAAS are then made to the Council of the Academy. In addition, the representative receives a rather large mailing from NAAS throughout the year, and this material should be digested for items of import to the South Carolina Academy of Science.

The primary purpose of the NAAS is to provide an organization for the promotion of the common aims of the various academies and the American Association for the Advancement of Science (AAAS).

The second purpose of the NAAS is to aid all member academies in their common purposes and accomplishments. Toward this end an annual meeting is held, in conjunction with the AAAS Convention, at which time delegates from the member academies participate in a day-long program of activities involving subjects of concern to academies of science. In addition, the Board of Directors of the NAAS and the committee members work throughout the year on matters that are supportive of member academies — planning the program for the Annual Meeting, including the program of the American Junior Academy of Science, distributing mailings to the officers of the member academies, including Newsletters, and meeting with AAAS Representatives to discuss and to plan cooperative endeavors such as youth activities in science.

REPRESENTATIVE TO THE SC RESEARCH AUTHORITY ADVISORY BOARD

A member or former member of Council is appointed at the recommendation of the President and approval of Council to serve a three-year term as the SCAS representative to the Advisory Board of the SC Research Authority. This board meets quarterly to evaluate demographic and business trends and to make recommendations to advance South Carolina as a desirable site for establishing new business ventures.

VIII. STANDING COMMITTEES

BULLETIN ADVISORY COMMITTEE

The committee's responsibility is to issue the Bulletin of the South Carolina Academy of Science annually, preferably one month before the Annual Meeting which it covers. The Bulletin Editor has the following responsibilities:

1. To include in the Bulletin the following items relating to the previous Academy year just ended:
 - b. a list of committee chairs and members;
 - c. committee reports;
 - d. minutes of Council meetings;
 - e. minutes of the previous Annual Business Meeting;
 - f. a list of major awards made with a brief biographical/ professional essay about each awardee;
 - g. a membership list, with patron members prominently identified.
2. To include in the Bulletin the following items relating to the upcoming Academy Annual Meeting:
 - a. a description of the symposium or special lecture;
 - b. the schedule of SCAS technical sessions and the abstracts of all papers to be presented;
 - c. the schedule of SCJAS technical sessions and the abstracts of all papers to be presented;
 - d. other information pertaining to the SCAS/SCJAS annual meeting as appropriate.

GOVERNOR'S AWARDS FOR EXCELLENCE IN SCIENCE COMMITTEE

The Governor's Awards for Excellence in Science, formally the Drug Science Foundation Contribution Award to Science in South Carolina, is under the joint sponsorship of the Governor's Office, and the South Carolina Academy of Science. Each of two awards, consists of an honorarium of \$1,000 and a citation and is presented at the Annual Meeting of SCAS. One award is given for science discovery and the other award is for science awareness.

The process of selecting the recipient of the award each year is conducted by an Award Administrative Committee and an Award Selection Committee, chaired by members of the Academy. The Administrative Committee is responsible for the preparation and distribution of the nomination form, receipt of the nominations with supporting documentation, duplication of these documents, and distribution of a completed packet to members of the Selection Committee. In addition, the Administration Committee prepares the citation for presentation to the recipient at the Annual Meeting. The Selection Committee consists of a chair from the Academy, a representative from the Governor's Office, a representative from the South Carolina Commission of Higher Education, representatives from USC, MUSC, and Clemson University, a representative from the smaller colleges in the state, and two other members selected from industry and/or the Savannah River Plant. The members serve two-year terms and the terms are staggered such that half are selected each year. The Chairman of the Selection Committee is responsible for recruitment of the members of the selection Committee, with assistance from the Council of the Academy.

Normally the announcements for the Award are mailed in November of each year with a deadline of January 15 for receipt of completed nomination forms. The Selection Committee meets in February to select the recipient of the Award.

HIGH SCHOOL RESEARCH AWARDS COMMITTEE

The South Carolina Junior Academy of Science (through funding from the American Association for the Advancement of Science and the South Carolina Academy of Science) and the Clemson University Chapter of Sigma Xi jointly sponsor junior research grants for high school students. These research grants are made in order to further encourage the investigation in pure and applied mathematics and science. Each grant is to be used for a research project to be carried out by a suitably qualified student enrolled in a high school in South Carolina. The award is to be used by the student primarily for expenses such as chemicals, minor equipment items, or other supplies; this includes expenses incurred in good faith for successful completion of the project. Travel expenses are not included.

The High School Research Awards Committee:

1. Sends an announcement to all high schools in South Carolina soliciting applications in the fall and in the spring.
2. Collects and provides for the evaluation of these applications.
3. Makes awards to fund those proposals deemed worthy.
4. Prepares award and congratulatory letters for the President's signature.

LONG RANGE PLANNING COMMITTEE

The purpose of the Long Range Planning Committee is to plan the growth and development of the Academy. It should propose new programs and activities and evaluate current activities. It should review suggestions from

the Council or the membership and make recommendations based upon these. Its chairman shall be the President of the Academy. This committee is made up of the Council Officers, and has responsibility:

1. To recommend new programs.
2. To review and evaluate suggestions from all sources. The Committee should actively solicit suggestions from all Academy members.
3. To make recommendations to the Council designed to improve the organization, activities, and services of the Academy.
4. To meet at least quarterly and as required by its business.
5. To review the Manual of Procedures and make recommendations for its updating, including the Constitution and Bylaws of the Academy.
6. The President, as chairman of this committee, shall submit an annual report of the deliberations of this Committee for publication in the Bulletin. This report should include all ideas considered whether approved or not.
7. To receive all requests for financial support for programs and events not normally sponsored by the Academy. Each request must be transmitted to the Council with a recommendation for approval, modification, or rejection.

MEMBERSHIP COMMITTEE

The Membership Committee is appointed annually by the President. The Chairperson, however, may submit to the President the names of those persons preferred to serve on the committee. The Committee may be as large as is manageable, with representation from as many different institutions over the state as is practical. The Chairperson and/or other Committee members may be asked to serve more than one year so as to provide greater continuity of membership activities.

The Committee's purpose is to solicit, maintain and increase membership in the Academy by contacting prospective members, promoting the programs and aims of the Academy and encouraging attendance at and participation in the Annual Meeting. Insofar as is practical, promotional materials should be distributed everywhere in the state where new members might be found and personal contacts should be made with Academy representatives at all institutions or places of employment where members might be recruited.

The Committee should consider various ways by which membership might be increased and also the interest of members sustained and Academy membership made more meaningful, and should make appropriate recommendations to the Council or the Long Range Planning Committee.

The Committee has the responsibility of recommending persons for Emeritus membership, distinguished membership and honorary membership.

NECROLOGY COMMITTEE

The Necrology Committee's task is to make inquiry about any members who have died since the preceding Annual Meeting of the Academy and to make a biographical report concerning deceased members at the succeeding Annual Meeting. After the chairman has made his report, it is customary for the members of the Academy to rise for a moment of silence in honor of these persons.

A sample letter of inquiry which is sent to the various institutions in the state is given as follows (the date will vary based on the time of the Annual Meeting):

(return address)
February 12, 1995
(addressee)

Dear _____:

The Necrology Committee of the South Carolina Academy of Science is preparing a report concerning any deceased members who have passed away since the meeting of last spring. For this reason we are writing you requesting that you send us any information concerning the death of any member associated with your organization or institution which has occurred during the past year.

For this report we wish the full name of the deceased and his last position. In addition we would like to have a biographical sketch, a list of his previous positions, and his accomplishments.

In order to get this report ready for the April meeting, we shall appreciate it very much if this information is sent early enough so that we can receive it by March 23.

Yours sincerely,

The Necrology Committee of The South Carolina Academy of Science

The report of the Necrology Committee is printed in the Bulletin in the form of biographical sketches of the deceased members of the Academy.

NEWSLETTER COMMITTEE

The Newsletter Advisory Committee assists the Editor by establishing the journalistic policy of the Newsletter and by suggesting possible editorial subjects. Individual committee members may, from time to time, contribute feature articles, news items or editorials. The Council has approved the selling of advertising space to appropriate organizations or companies.

NOMINATIONS AND ELECTIONS COMMITTEE

The Nominations and Elections Committee consists of the Past President as Chairperson, and the two most recent Past Presidents. Duties of the Committee are to present a slate of nominees to the Academy membership for the offices of Vice-President, and three Councilors. On years when their terms expire, a slate of nominees for Secretary and Treasurer will be formulated. Names and biographical sketches of all nominees will be published in the Newsletter immediately preceding the Annual Business Meeting.

Elections are held during the Annual Business Meeting. The President announces the names of the nominees and asks them to stand to be recognized. A ballot will be distributed to all members in attendance. The President will appoint a Ballot Committee, of at least three members, who will tally the votes. A simple majority is required for election. In the event a nominee for Councilor does not receive a simple majority, a run-off election will be conducted between the two nominees with the largest number of votes. Results are announced before the business meeting is adjourned.

PATRON MEMBERSHIP COMMITTEE

The role of the Patron Membership Committee is to maintain contact with the Academy's patron members and to encourage their participation in and support of Academy activities. It also encourages each member of the Council to promote patron membership among institutions and industries in their regions of South Carolina.

The Chairman of the Committee on Patron Members shall:

1. Be elected by Council for a three-year term which is renewable;
2. Obtain from the Treasurer the annual dues invoices for patron members and to forward these invoices with a letter outlining recent Academy activities to each patron member. Patrons should send their dues directly to the Treasurer.
3. Conduct all correspondence with patrons and prospective patrons;
4. Report at suitable intervals to the Treasurer and to Council.

The Responsibilities of the members of the Committee are:

1. To assist the Program Chair in contacting nearby industrial patron members for service on the Steering Committee for the Annual Meeting.
2. To seek additional institutional and industrial patron members.
3. To contact those patron members who do not respond to the dues notices and to encourage their membership renewals.

PROGRAM COMMITTEE

It is the responsibility of the Program Committee, chaired by the President-Elect, to prepare a program and make all physical arrangements for the Annual Meeting. The Program Committee Chair should appoint individuals to head local arrangements and sections. The date(s) and location of the meeting should be submitted to the President for approval no later than the July Council meeting preceding the Annual Meeting. After soliciting suggestions for the program, the Program Committee Chair should discuss general plans, including special speakers, symposia, banquets, etc., at the July and September Council meetings. Budget for the meeting should be prepared by late summer. Plans should be complete in time for inclusion in the Call for Papers and accompanying letter and other materials which go out to the membership in September or October Newsletter.

The Executive Director of the Junior Academy of Science should be kept informed of meeting plans and coordinate with the Program Committee Chair on Junior Academy meeting plans. Individuals in charge of sections should solicit members and institutions in their fields for submission of papers for the Annual Meeting. The local

Arrangements Committee should schedule and equip all rooms for the meeting. It should also arrange with the Treasurer for the maintenance of the registration desk and attendance record of the meeting.

Other professional groups wishing to meet jointly with SCAS should be notified by the Program Committee Chair. These organizations should be granted a place on the program.

PUBLICITY COMMITTEE

The Publicity Committee is charged with the responsibility of collecting, assembling and disseminating newsworthy information, human interest stories, pictures, facts and general news which would promote the South Carolina Academy of Science in any and all forms of media.

The Committee is responsible for updating and printing brochures periodically.

The committee should develop channels of communication with newspapers, magazines, radio and television stations.

Among the goals and objectives of the committee should be: to bring the Academy favorably to the attention of the public as the principal support group for Science in South Carolina, to enhance the recognition of the Academy, and to explain and clarify the role of the Academy in promoting science both as an intellectual pursuit and a benefit to the welfare of mankind. All Academy-sponsored events, programs, awards and activities should be publicized and scientific activity within the state should be sought out and promoted in the media.

RESOLUTIONS COMMITTEE

This Committee formulates resolutions expressing the appreciation of the Academy to its hosts for the Annual Meeting and to any other special person(s) or group(s) to whom expressions of appreciation should be made. The Chairperson of the Committee is appointed by the President. A member of the Committee presents the resolution(s) at the annual business meeting of the Academy, provides the Secretary with a copy, and suggests that a motion for the adoption of the resolution(s) be made.

SCIENCE FAIRS COMMITTEE

The President annually appoints the Chairman; it has been customary for the Chairperson to serve for a number of years.

The Science Fairs Committee has the responsibility of:

1. Promoting Science Fairs in South Carolina, both on a local and regional level, although most of its effort has been directed at the regional level.
2. Working with directors from each region who are certified by the International Science and Engineering Fair organization in Washington, D.C. (Division of Science Services).
3. Preparing a Directory of Regional Fairs to include the following information: Director, Location, Date of Fair, and Fair Sponsors. This Directory is printed in the SCAS Newsletter.
4. Aiding each regional director, where possible, but accepting no financial responsibility for itself nor the Academy beyond the following:
 - (a) providing appropriate award medals and SCAS certificates of merit for participants from each region, when requested; and
 - (b) providing one Head Chaperone to accompany all regional winners to the International Science and Engineering Fair wherever it is held.
5. Making housing reservations and, when feasible, travel arrangements for winners from all regions to the International Science and Engineering Fair. The expenses for all of these, except for the official SCAS appointed chaperone, are the responsibilities of each region.

SCIENCE WEEK COMMITTEE

The purpose of this committee is to bring about a week long, statewide focus on science and science-related activities.

The Committee accomplishes this by:

1. Applying for a proclamation of a "Science Week" from the Governor's Office.

2. Developing a packet of resource information for elementary, middle, and high school teachers, to be distributed through school superintendents, often using materials available for National Science Week.
3. Advertising Science Week and activities in the media, including the SCAS and SCJAS Newsletters.

SECONDARY SCIENCE OR MATH TEACHER OF THE YEAR SELECTION COMMITTEE

This committee requests nominations and selects the Science or Mathematics Teacher of the Year; this was formerly designated the Cryovac Award. During the summer, the selection committee chair is appointed by the President who may appoint an additional committee member or members at that time. The committee chair then selects additional committee members as needed to complete the assigned task. For the sake of continuity, the chairman should be asked to serve for several consecutive years.

In late Autumn the committee chair solicits nominations from high school principals and heads of science and math departments across the state. Address labels from the State Department of Education are used for this purpose. A special form is provided for submitting the nominations, and a deadline is set in mid-November for the return of the nomination forms.

During the last week in November, nominees are informed and are requested to submit a portfolio to include: biographical information, performance information and two letters of recommendation. The forms are included in a packet of procedures that is passed from chairman to chairman. The deadline for returning the forms is mid-January.

The selection committee completes evaluation of the portfolios and arrives at a consensus winner by the end of February. The committee members grade each candidate on special forms using a scale of 300 points for a perfect score.

The committee chair totals the scores and determines the winner. The winner and runner-up are notified. Certificates containing biographical information are prepared and the certificates, a monetary award, and an expense-paid trip to the annual AAAS meeting are presented at the annual banquet of the Academy.

UNDERGRADUATE RESEARCH AWARDS COMMITTEE

The Undergraduate Research Awards Committee is appointed annually by the President. The Chairperson, however, may submit to the President the names of those persons preferred to serve on the committee. The Chairperson and/or other Committee members may be asked to serve more than one year so as to provide greater continuity of membership activities. Except for the Chair, Committee members do not have to be members of the Council.

Funding for the awards is derived from the contributors from the several chapters of Sigma Xi within South Carolina. The Committee is responsible for administering awards for outstanding undergraduate research at colleges and universities within the State of South Carolina. The purpose of the Sigma Xi awards is to foster, encourage and recognize the work done by undergraduates in South Carolina on projects of exceptional scientific merit. The awards are made by a panel of two year college qualified scientists and are based on evaluation of the research presented by students before the Academy at its Annual Meeting.

The Committee's duties include arranging financial donations or other prizes for appropriate awards, developing criteria for awards, selecting judges, organizing judging activities, and making arrangements for awarding prizes.

TWO YEAR COLLEGE COMMITTEE

The Two Year College Committee Chairperson is appointed annually by the President. The Chairperson may submit to the President the names of those persons preferred to serve on the committee. The Chairperson and/or other Committee members may be asked to serve more than one year so as to provide greater continuity of two year college activities.

The purposes of the committee are:

1. to promote membership in the Academy from among two-year college faculty, administrators and students;
2. to promote participation of two-year college faculty and students in Academy annual meetings, Junior Academy workshops, and MESAS workshops;
3. to promote the presentation of two-year college research at Academy meetings;

4. to organize a session (or sessions) for two-year college research presentations at the annual meeting of the Academy and, at its discretion, plan for a two-year college focus group or special session at the annual meeting or at another time as deemed appropriate by the Committee.
5. to administer awards for outstanding undergraduate research at two year colleges within the State of South Carolina. The purpose of the awards is to foster, encourage and recognize the work done by undergraduates on projects of exceptional scientific merit. The awards are based on evaluation of the research presented by students before the Academy at its annual meeting. The Committee will arrange for financial donations or other prizes for appropriate awards, develop criteria for awards, select judges, organize judging activities and make arrangements for awarding prizes.
6. to be cognizant of and recommend to Council sources of awards for two-year college research projects, research presentations and teaching excellence; and
7. to recommend to Council ways to improve relationships between two-year college personnel and other Academy constituencies.

END
SCAS MANUAL OF PROCEDURES

South Carolina Academy of Science Members

The area of membership is listed above the academy member's name

Emeriti Members	Life Members		
General Science W P Bebbington 4274 Owens Rd #2307 Evans, GA	Biology Laura C Adams 315 S Farr Ave Andrews, SC	Psychology David E Clement Dept of Psychology Columbia, SC	Chemistry Hugh E Henry 356 Walker Ave SE Aiken, SC
Physics and Astronomy Ralph E. Blakely Dept of Physics Rock Hill, SC	Biology Radman M Ali Morris College Sumter, SC	Chemistry Joe B Davis 1475 Riverview Road Fort Lawn, SC	Biology Richard D Houk Dept of Biology Rock Hill, SC
General Science Peggy Cain 715 Camp Branch Road Sumter, SC	Chemistry Daniel J Antion 135 Delieesseline Rd Cayce, SC	Chemistry James P Deavor Dept of Chemistry Charleston, SC	Medical Science Jane B Jennings 112 Country Club Rd Savannah, Ga
Chemistry Kenneth Nolon Carter 508 N Florence St Kirksville, MO	Chemistry Gary L Asleson Dept of Chemistry Charleston, SC	Chemistry James R Durig Dept of Chemistry Kansas City, MO	Mathematics Don M Jordan College of App Prof Sci Columbia, SC
Biology G T Cowley 70 Beacon Hill Ct. Columbia, SC	Chemistry Charles F Beam Jr Dept of Chemistry Charleston, SC	Chemistry Michael H Farmer Applied Educational Technology Tigerville, SC	Geology William H Kanes Earth Sci and Resources Inst Columbia, SC
Chemistry H Willard Davis 302 Joseph Walker Dr West Columbia, SC	Physics and Astronomy Joel C Berlinghieri Dept of Physics Charleston, SC	Engineering Joseph H Gibbons 6300 Macon Road Columbia, SC	Mathematics Manuel Keepler Dept of Math & Comp Sci Durham, NC
Biology Harry H Freeman 1340 Bluebird Drive Mt Pleasant, SC	General Science John D Bernard 2542 Six and Twenty Road Pendleton, SC	Chemistry Scot and Regis Goode Dept of Chemistry & Biochemistry Columbia, SC	Chemistry Leonard C Keifer 8 Blue Silo Court Gaithersburg, MD
General Science W Curtis Worthington Jr 1 Bishop Gadsden Way Charleston, SC	Biochemistry William R Boone 107 Cardinal Court Simpsonville, SC	Chemistry Gamil Guirgis Chemistry & Biochemistry Charleston, SC	Chemistry W Frank Kinard College of Charleston Charleston, SC
Honorary Members of the Academy	General Science Bill Brumbach Carolina First Bank Columbia, SC	Chemistry Sharon K Hahs Provost and VC for Academic Affairs-Box 1021 Edwardsville, IL	Biology Flo Hester Leroy 140 Savannah Street Calhoun Falls, SC
General Science Ruth Patrick Academy of Natural Sciences Philadelphia, PA	Computer Science Shobha Choudhari FR12, Buckley Orangeburg, SC	Mathematics Hamilton Career Center 100 Vocational Drive Seneca, SC	Chemistry Scott Little 130 S Waccamaw Columbia, SC
Chemistry Bassam Z Shakhashiri Univ of Wisconsin- Madison Madison, WI	Computer Science Ramesh M Choudhari Dept of Math & Computer Sci Orangeburg, SC	Chemistry Frederick Joseph Heldrich Dept of Chemistry and Biochemistry Charleston, SC	Chemistry Joseph P Mitchener PO Box 134 Zionville, NC
Physics and Astronomy Charles H Townes Dept of Physics Berkeley, CA			Biology Maxine H Moore 113 Romaine Drive Spartanburg, SC

Biology Susan J Morrison Dept of Biology Charleston, SC	Biology Richard Stalter Direc Environmental Studies Jamaica, NY	General Science Coastal Carolina University Ron Ingle, President Conway, SC	General Science Lander University Friederike Wiedemann Greenwood, SC
Physics and Astronomy Robert C Nerburn Professor of Physics Sumter, SC	Chemistry DeWitt B Stone Jr 108 Poole Lane Clemson, SC	General Science College of Charleston School of Science and Mathematics Charleston, SC	Biology Martin Microscope Company Robert Martin Easley, SC
Biology John B Olson 1018 Sloan Dr. Rock Hill, SC	General Science Bob Stutts 1850 Atlantic Drive Columbia, SC	General Science Cryovac Division of Sealed Air Don Watt Duncan , SC	Engineering Pete Mazzaroni 6173 East Old Marion Hwy. Florence, SC
Biology Richard E Petit PO Box 30 N Myrtle Beach, SC	Biochemistry James Zimmerman Dept of Biochemistry Clemson, SC	Physics and Astronomy Colgate W Darden 487 Peachtree Rock Road Lexington, SC	Chemistry Jennifer Howard Meadwestvaco Corp Communications Manager Charleston, SC
Geology William E Powell 9 Stonebriar Rd Columbia, SC	Chemistry Hans Conrad Zur Loye 6 Bakers Point Court Columbia, SC	General Science Erskine College Donald V. Weatherman Due West, SC	Chemistry Med Univ of South Carolina Raymond Greenberg Charleston, SC
Medical Science Glenn Quarles PO Box 5127 Kingsport , TN	All Patrons for the Last 10 years	General Science Greater Piedmont Chapter Explorers Club John Saffko, Treasurer, Physics & Astronomy Columbia, SC	Medical Science Library & Learning Resources Med Univ of South Carolina 171 Ashley Ave., Suite 310 Charleston, SC
Physics and Astronomy Terry R Richardson Dept of Physics Charleston, SC	Biochemistry Pendleton Cancer Foundation & Fairview Industries, Inc 233 East Main Pendleton, SC	General Science Francis Marion University Richard Chapman, Provost Florence, SC	General Science Phibro-Tech Inc 1 Parker Plaza Fort Lee, NJ
Physics and Astronomy John L Saffko Sr 3010 Amherst Ave Columbia, SC	General Science Applied Education Technology Mike Farmer Tigerville, SC	General Science Furman University A V Huff, Jr Greenville, SC	General Science Presbyterian College Dave Gillespie Clinton, SC
Mathematics H E Scheiblich 1117 Bookman Road Elgin, SC	General Science Benedict College David H Swinton, President Columbia, SC	General Science Govern's School, Sci & Math Lee Cox Hartsville, SC	General Science President Medical University of South Carolina Charleston, SC
Geology W Edwin Sharp Dept of Geology Columbia, SC	Chemistry Carolina Eastman Company W C Cash, Jr Columbia, SC	General Science Greenville Technical College Art McConnell Greenville, SC	Biochemistry Roche Carolina, Inc Peter Mazzaroni, Community Affairs Florence, SC
Biology John D. Spooner Univ of South Carolina- Aiken Aiken, SC	General Science Office of the Provost, Clemson University c/o Academic Affairs, 206 Sikes Hall Clemson, SC	Chemistry Carey A Jackson Environmental Science Sumter, SC	General Science Roper Mountain Science Center 402 Roper Mountain Road Greenville, SC
Chemistry Gordon Sproul 980 Edith Lane Beaufort, SC	General Science Sigma Xi Chapter Clemson University c/ o N Dwight Camper Clemson, SC		
Biology Sarah F Stallings Dept of Human Nutr & Food Sys Mgm Rock Hill, SC			

General Science Roper Mtn Science Center Darrell Harrison Greenville , SC	General Science USC Aiken Blanche Premo-Hopkins, V Chancellor Aiken, SC	Biochemistry Cynthia Wright 1340 Old Brickyard Road Mt. Pleasant, SC	General Science John E Ratterree Allison E Ratterree Chesnee, SC
General Science S Carolina Research Authority Dr. Larry Druffel Columbia, SC	General Science Univ of S Carolina, Sumter C L Carpenter, Dean Sumter, SC	Joint Members	General Science Jack A Turner Jane Turner Spartanburg, SC
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Biology SC Assoc of Conservation Dists Walter Cousins Columbia, SC	Medical Science William C. Von Meyer 233 E. Main St. Pendleton, SC	Biology Bret Clark Sharah Clark Newberry, SC	Regular Members
Chemistry Sequa Chemicals Inc Jack Cabrey Chester, SC	General Science Winthrop University College of Arts & Sciences Rock Hill, SC	Computer Science Patsy Earnhardt Shelia J Pittman Salem, SC	Chemistry Richard Adams Dept of Chemistry & Biochemistry Columbia, SC
General Science Clemson Chapter of Sigma Xi	General Science Wofford College Dan B Maulsby Spartanburg, SC	Biology Nora R Espinoza Richard W Blob Central, SC	Physics and Astronomy Saul J Adelman Dept of Physics Charleston, SC
General Science Charleston Chapter of Sigma Xi	Contributing Members	Biology David K. Ferris Kathleen Ferris Spartanburg, SC	Physics and Astronomy Mikhail Agrest Dept of Physics and Astronomy Charleston, SC
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General Science Sonoco Products David Compton Hartsville, SC	Biology Mary Ellen C Guest 106 Pearl Ave Marietta, SC	Biology Naseema M Hoosein Mansoor A Hoosein Orangeburg, SC	Biology Omar Bagasra Director - SC Center for Biotechnology Orangeburg, SC
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General Science The Citadel MGEN Roger C Poole Charleston, SC	Biochemistry Karen L Pompeo 925 Windro Sumter, SC	Biology Sharon Brown Miller Ansel E Miller Clemson, Sc	Biology Tiffany Baker 1825 Sandcroft Drive Charleston, SC
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	Biology Waltena Simpson 300 College St Orangeburg, SC		Biology Thomas Vernon Beaty 184 Twisted Hill Rd Irmo, SC

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Chemistry Alex Bell Trident Technical College Charleston, SC	Geology Lyle D Campbell 126 Greengate Lane Spartanburg, SC	Chemistry Anne Cummings WTC Pawleys Island, SC	Biochemistry Valgene L Dunham 106 Vassal Ct Conway, SC
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Biology Debbie(Dorothy) Bishoff Morris College Sumter, SC	Biology Ajoy G Chakrabarti PO Box 7157 Orangeburg, SC	Biochemistry Alix G. Darden Biology Dept. Charleston, SC	Computer Science Caroline M Eastman 4165 East Buchanan Drive Columbia, SC
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Biology Charles A Blake Dept of Cell Biology & Neuroscience Columbia, SC	Chemistry Donna A Chen 631 Sumter St Columbia, SC	Chemistry John H Dawson University of South Carolina Columbia, SC	Geology Dr. Leon Ember 8-B Marsh Harbor Dr Lady's Island, SC
Chemistry James R Blanton Dept of Chemistry Charleston, SC	Biology Mohammed K Chowdhury 400 Magnolia St Orangeburg, SC	Chemistry M Lynn Deanhardt Lander University Greenwood, SC	Chemistry Joe N Emily 500 Pine Hill Rd. Orangeburg, SC
Computer Science John B Bowles 110 Millstream Rd Lexington, SC	Psychology James R. Coleman Dept. of Psychology Columbia, SC	Biology Mike Dewey Dept of Biology Columbia, SC	Chemistry David W Evans 2377 Clandon Dr Myrtle Beach, SC
Physics and Astronomy Patrick Briggs Dept of Physics Charleston, SC	Biology William H Conner Baruch Forest Science Inst Georgetown, SC	Biochemistry Mathieu Dflem Dept of Sociology Columbia, SC	Chemistry Chad Everette 471 University Parkway Aiken, SC
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Biology Karin J L Burg Dept. of Bioengineering Clemson, SC	Physics and Astronomy Thomas M Crawford USC Nanocenter Columbia, SC	Biology Dwight Dimaculangan Winthrop University Rock Hill, SC	Biology David K. Ferris USC Upstate Spartanburg, SC
		Physics and Astronomy Robert J (Bob) Dukes Jr Dept of Physics Charleston, SC	

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Biology James L Knight South Carolina State Museum Columbia, SC	Chemistry Chad Leverette	Medical Science Jennifer Maze 320 Stanley Ave Greenwood, SC	Chemistry Stephen L Morgan Dept of Chemistry and Biochemistry Columbia, SC
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Biology Thomas Kozel Chair, Dept of Biology Anderson, SC	Chemistry Susan Libes Dept of Marine Science Conway, SC	Chemistry Christina P McCartha 271 Chapin Road Chapin, SC	Biology Timothy A Mosseau Biological Sciences Columbia, SC
Chemistry Kristin D Krantzman Dept of Chemistry Charleston, SC	Physics and Astronomy Varavut Limpasuvan Dept. of Chemistry and Physics Conway, SC	Biology George McCoy Dept of Biology Columbia, SC	Biology Christine Murphy 5023 Mt Vernon Dr Seneca, SC
Physics and Astronomy Varsha P Kulkarni Dept of Physics and Astronomy Columbia, SC	Biology Suzanne Lindley 135 Brittany Rd Gaffney, SC	Biology Larry Joe McCumber Dept of Biology Florence, SC	Physics and Astronomy Jeannette Marie Myers 2229 Pamlico Hwy Florence, SC
Physics and Astronomy Milind Kunchur Dept of Physics and Astronomy Columbia, SC	Physics and Astronomy Larry L Lowe 401 Chantilly Circle Seneca, SC	Chemistry Julian McGill 1023 S Shem Drive Mount Pleasant, SC	Physics and Astronomy Fred Myhrer Dept of Physics and Astronomy Columbia, SC
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Biology Sandra F Larson 3300 Poinsett Hwy, Dept of Biology Greenville, SC	Biology Marie Mackey Drawer 1007 NETC Cheraw, SC	Biology David McNamara 3011 Monroe Columbia, SC	Physics and Astronomy James Neff Dept. of Physics and Astronomy Charleston, SC
Chemistry Robert P Lawther 3019 Columbia Columbia, SC	Chemistry David R Magnin 880 Breezybay Lane Sumter, SC	Geography David C McQuillan Map Library Columbia, SC	Geology Douglas Nelson Marine Science, Coastal Carolina University Conway, SC
Physics and Astronomy Michael S Leonard 1416 Victoria St Columbia, SC	General Science William Mahoney 1330 Lady St Columbia, SC	Biology Marjorie B Miller 1078 Freeman Bridge Rd Easley, SC	General Science Norine Noonan Dean Science and Math Charleston, SC
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AUTHOR INDEX

Abalo 29
Abdul 22, 64
Agrest 25, 58
Albury 22, 59
Alexander 29, 42, 44, 47, 51, 55
Alexov 50
Allen 22, 59
Alphonese 24, 87
Amirzadeh 19, 62, 85
Anderson 29
Andrews 55
Atwood 30
Ayers 30
Ayme-Southgate 23, 28, 71, 76, 80

B

Baatz 41
Baccus 19, 63
Bagasra 22, 92
Ballesteros 27, 59
Bayoumi 35
Beam 19, 64, 67, 81
Berry 30
Beysens 27, 78
Bolger 23, 60
Bookert 24, 60
Boone 21, 23, 68
Boston 28, 77
Boyer 25, 61
Brinton 31
Brown 19, 67, 81
Buchanan 25, 83
Buckson 31
Bunn 38, 39, 42, 46, 50, 52
Burnett 32
Burnham 27, 83

C

Caicedo 35
Callahan 22, 61
Camper 19, 81
Carlton 19, 62
Carner 47
Carson 48, 51
Carver 32
Castanha 21, 22, 61, 71
Catlett 28, 62
Catotti 32
Chang 28, 77
Chaudhry 24, 87
Chen 23, 33, 46, 60
Chepkoech 22, 62
Chowdhury 39, 46
Cohen 31

Coker 33
Conner 24, 65
Connolly 43
Cooksey 39
Covington 28, 63

D

Davis 19, 34
Davis Jr. 63
Dawsey 19, 64, 67, 81
Dawson 45
del Sol 42
Delgado 87
Dineley 36
Dion 34
Dixon 35
Dodds 22, 64
Dougal 33, 37
Drinkwater 27, 65
Duberstein 24, 65
Dukes Jr. 25, 61
Dupont 23, 66
Dyer 24, 60

E

Eisenberger 35
Elie 49
Emily 20, 88
Esquivia-Zapata 22, 62

F

Fadel 53
Feigley 21, 71
Fernandes 20, 84
Flaherty 27, 28, 62, 83
Fleming 20, 66
Floyd 36
Fox 21, 22, 61, 71
Fragile 25, 27, 74, 78
Fraj 22, 62
Fraser 83
Fraser1 27

G

Galassie 36
Garrabos 27, 78
Gatzke 53
Gerberich 28, 62
Gerolstein 21, 66
Gibbons 42, 47
Gilg 19, 89
Glenn 27, 77
Godwin 32, 33, 35, 37, 53, 54

Goschy	19, 67
Gosnell	37
Grant	23, 68
Graves	21, 72
Gray	22, 27, 28, 62, 63, 69, 73
Green	28, 37, 77
Gresham	55
Griffon	28, 77
Grigoryan	24
Gulledge	90
Gunter	37
Gupta	23, 68
Guyette	38

H

Hale	38
Harmon	27, 28, 59, 65, 75, 76
Harrod	54
Hayes Jr.	27, 69
Hegseth	27, 78
Hendley	21, 69
Hickman	20, 70
Higdon III	21, 23, 68, 72
High	27, 70
Hill	51
Hoosein	22, 64
Horton	28, 77
Hossain	39
Huang	39
Hughes	39
Hyun	40

J

James	21, 71
Jankowski	28, 71
Johnson	21, 28, 62, 72
Jones	21, 24, 25, 40, 71, 83, 87, 89
Jones-Cooper	29, 36, 39, 40, 47, 50
Jung	24, 87

K

Kao	21, 72
Kara	34
Kaye	26, 81, 86
Kelly	36
Kernizan	24, 87
Khan	24, 26, 81, 86, 87
King	27, 73
Kirven	41
Knight	19, 64, 67, 81
Koley	42
Kosal	20, 84
Kubalak	50
Kundrotas	50
Kuntz	21, 80

Kuthirummal	25, 89
Kwon	41

L

Lackey	73
LaCross	30, 33, 44, 48, 54
Lamont	24, 87
Lane	27, 83
Lang	52
Lavin	27, 77
Lawton-Rauh	32
Lewandowski	25, 61
Lewis	20
Lindner	25, 74
Lucas	42
Lucius	42
Luo	37
Lux III	23, 66
Lynn	34

M

Mader	44
Magnin	19, 63
Mahroof	24, 74
Maria	19, 89
Martin	23, 43, 75
Maxwell	28, 75
Mayson	24, 76
Maze	23, 91
McClary	43
Mcknight	44
McMahon	44
Mecham	20, 84
Mentrup	28, 76
Metz	19, 81
Miller	23, 45, 76
Mills	26, 85
Mitchum	28, 77
Moore	45
Morrison	23, 60
Morse	37
Myers	49

N

New	27, 77
Ni	46
Niehaus	27, 78

O

Obeid	52
Oliva	28, 71
Oliver	22, 59
Oprisan	27, 77, 78
Otieno	20, 84

P

Padgett	28, 78
Padmanabhan	23, 68
Panasik	21, 90
Paramaswaran	43
Parameswaran	34, 38, 40, 41, 43, 46
Parker	71
Patten	53
Pennington	19, 81
Peterson	20, 25, 66, 70, 79, 84
Philipp	23, 80
Pittard	46
Pleasant	21, 80
Pompeo	27, 70
Posey	85
Potter	19, 64, 81
Powell	46
Preyer	25, 83
Prohaska	26, 81

R

Rae	28, 82
Ramos	21, 82
Rasheed	47
Ray	40
Raychoudhury	22, 23, 75, 91
Rayfield	27, 83
Reddy	38
Reynolds	25, 83
Richter-Maze	23, 91
Riggs	20, 84
Riggs-Gelasco	92
Riley	27, 28, 63, 69
Rishmawi	20, 84
Robinson	19, 85
Rogers	47
Rolfson	26, 85
Rollinson	22, 23, 75, 91
Rosset	48
Rudolph	42
Russo	48
Rusthoven	49

S

Salzberg	21, 71
Seal	21, 80
Sebastian	49
Sekula	31
Senter	23, 68
Shannon	22
Shelnutt	50
Shoppell	50
Shorter	85
Shychuk	27, 83
Siegel	32, 36, 37, 39, 49

Simionescu	56
Siragusa	21, 80
Slone	24, 86
Smith ...	22, 27, 41, 42, 45, 46, 49, 50, 78, 86
Solensky	48
Song	55
Southgate	23, 80
Spicer	27, 73
Sreedharan	50
Sris	34, 35, 45, 52, 53, 56
Srivastava	34
Stackhouse	51
Stalter	24, 87
Stanton	51
Steele	20, 88
Stephens	52
Stroup	88
Sun	23, 40, 68
Sweitzer	33

T

Tansey	52
Tavrides	25, 89
Tedeschi	25, 79
Todd	23, 66
Tucker	19, 89
Turner	28, 77
Tzeng	50

V

VanDerveer	19, 81
Varazo	90
Velovic	24, 87
Vertegel	54
Voepel	53

W

Wagner	31, 48, 51, 55
Walker	21, 90
Wang	29, 54, 90
Ward	23, 91
Washington	20, 22, 91, 92
Watson	22, 41, 92
Weaver	27, 73
Wei	46
Weidner	44
Wells	29, 55
Wen	43
White	55
Whitehurst	26, 93
Whiteside	45
Wilson	28, 55, 75
Woodward	30
Woodworth	55

X

Xie 90

Y

Youssef 24, 87

Z

Zearfoss 28, 62

Zehnder 38

Zelmer 24, 76

Zhang 56

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