



Delmeshia Pringle (Morris College) with Dr. John B. Williams, South Carolina State University

Bethany Smith (Benedict College) with Dr. David G. Scott, South Carolina State University

Latoya Richardson (Midlands Tech. College) with Dr. Ajoy Chakrabarti, South Carolina State University

Tara Brooks (Morris College) with Dr. Ajoy Chakrabarti, South Carolina State University

## The Louis Stokes South Carolina Alliance for Minority Participation



### *LS-SCAMP Annual Science and Engineering Research Conference*

### *“Undergraduate Research: The Bridge to Success Through Experiential Learning”*

*July 25, 2003*

*South Carolina State University*

Tiffany D. Willis (South Carolina State University) at ARS



Nicole Strong (South Carolina State University) at ARS



Sharene Patterson (Voorhees College) at ARS



Bryan Knight (Claffin University) with Mary LaRue, ARS



Tiffany Richburg (South Carolina State University) at ARS



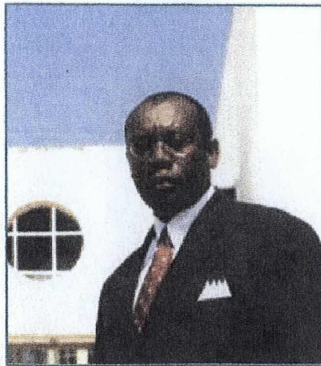
Ricky Careeker (South Carolina State University) with Deborah Posey, ARS



Tiana Gordon (South Carolina State University) at ARS



## *From the Office of the President....*



It is my esteemed privilege to welcome you to the campus of South Carolina State University. South Carolina State University, through instruction, research and service activities seeks to prepare highly skilled, competent, economically and socially aware graduates who meet and exceed the challenges of a dynamic global society. This university is especially committed to undergraduate education and research in the areas of science, mathematics and engineering technology (SMET) disciplines. As a mathematician and educator, I fully understand the critical need to produce increased numbers of minorities in these fields. In collaboration with eleven other colleges and university partners throughout the state we are dedicated to providing increased opportunities for students to participate in mentored research. We are honored to be the lead institution for the Louis Stokes – South Carolina Alliance for Minority Participation (LS-SCAMP) Program and we are excited to host the prestigious Annual Research Conference. Congratulations and best wishes to all conference participants.

**-Dr. Andrew Hugine, Jr., President, South Carolina State University**

## *From the Office of the Principle Investigator ....*



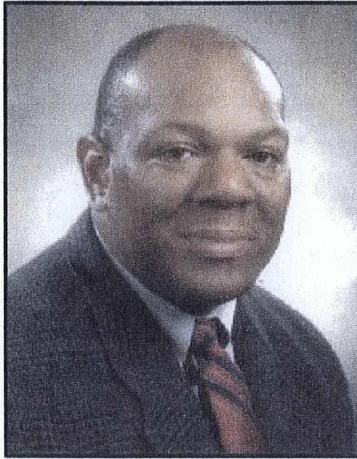
Welcome to South Carolina State University and the Summer Undergraduate Research Conference. Undergraduate research is the cornerstone of our program goals and objectives. The LS-SCAMP research component is designed to specifically address the persistence and progression of undergraduate students as they pursue degrees in SMET disciplines.

I am impressed with the quality of the abstracts submitted by the various participants and look forward to hearing the presentations. Each of you should be proud of your accomplishments as you represent this alliance and your home institutions.

Thank you, to all who worked diligently to make this conference a success. Appreciation is extended to all campus P.I.s, faculty and especially research mentors for making this phenomenal experience for our students possible.

**-Dr. James Arrington, LS-SCAMP Principal Investigator**

## *Keynote Speaker*



*Mr. Jeffrey Allison*

A graduate of Princeton University, with a B.Sc. in Chemical Engineering, Mr. Jeffrey M. Allison, was appointed the first African-American Manager of the U. S. Department of Energy Savannah River Operations Office in Aiken, SC in March 2003.

Over the course of his career, Mr. Allison has gained extensive experience in both the public and private sectors in a range of fields including: engineering, safety, process development and design, health, and hazardous waste disposal.

In his current job as manager of the Savannah River Operations Office, Mr. Allison manages a federal staff of about 400, an annual budget of \$1.5 billion, and oversees more than 13,000 contract personnel. His responsibilities include overall leadership, direction and contract management, oversight of all contractor and Federal activities associated with the Environmental Management risk reduction and clean-up mission performed at the Savannah River Site. Mr. Allison is a role model and advocate for the advancement of research training and education for under represented minority students.



**The Louis Stokes-South Carolina Alliance for Minority Participation  
 Summer Research Conference  
 South Carolina State University  
 July 25<sup>th</sup>, 2003**

10:00 a.m. – 11:00 a.m.	Registration Continental Breakfast Poster Set-up	1 <sup>st</sup> . Fl. Lobby, Belcher Hall
10:00 a.m. – 4:45 p.m.	Graduate School Recruitment Fair	1 <sup>st</sup> FL Lobby, Belcher Hall
11:00 a.m. – 11:45 a.m.	Opening Remarks Conference Instructions Presentation Overview	1 <sup>st</sup> . Fl, Belcher Hall
11:45 a.m. – 1:15 p.m.	Poster Presentations Engineering, Physical & Chemical Science Biological Sciences I Biological Sciences II Mathematics & Computer Science	Development Room
1:15 p.m. – 1:30 p.m.	Break	
1:30 p.m. – 3:30 p.m.	Oral Presentations Engineering Physical & Chemical Sciences Biological Sciences I Biological Sciences II Mathematics & Computer Science	Room 408, 4 <sup>th</sup> Floor Conference Room, 1 <sup>st</sup> Floor Room 132, 1 <sup>st</sup> Floor 4 <sup>th</sup> Floor Auditorium Room 407, 4 <sup>th</sup> Floor
3:30 p.m. – 3:45 p.m.	Break	
3:45 p.m. – 4:45 p.m.	Graduate Alumni Forum	
5:00 p.m.	Awards' Banquet <i>Oral and Poster Scholarship Winners</i>  Keynote Speaker – <i>Mr. Jeffery Allison</i>  Special Presentations – <i>The Congressman Louis Stokes Service Award The Dr. A. James Hicks Leadership Award The Dr. Judith Bostock Memorial Award Outstanding Research Mentor &amp; Intern Award</i>	Bulldog Lounge, K. W. Green Student Center

# **Poster Presentations**

11:45 a.m. – 1:15 p.m.

Development Room, 3<sup>rd</sup> Floor  
Belcher Hall

Poster Presentation  
Development Room, 3<sup>rd</sup> Floor  
Belcher Hall

Poster #	Title Presenter	Abstract #
1	<i>Camless Engine Research</i> <b>Joseph Bonivel</b>	32
2	<i>Effects of Air Pollutants on the Lipid Content of Germinating Vegetables Seed Species</i> <b>Tara Brooks</b>	12
3	<i>Data and Image Manipulation to Enhance the Development of State of the Art Scientific Presentation</i> <b>Ricky Carreker</b>	39
4	<i>Evaluation of Two Campylobacter Testing Methods Using Campy Line Agar</i> <b>Kristen Charles</b>	24
5	<i>Differential Expression of Toll-like Receptors on the Hepatocyte Membrane</i> <b>Travis Chavis</b>	26
6	<i>An Investigation of Poset Rankings of Graphs-The Case of Semi-Ranking by the V Partial Order</i> <b>Tufuantsi Daniel</b>	38
7	<i>Molecular Physiology of Mineral Uptake: The Role of Nicotianamine in Iron Transport Mechanisms and Plant Development</i> <b>LeAndria Dingle</b>	2
8	<i>Neurovascular Plasticity after Focal Ischemia in Mouse Whisker Barrel Cortex</i> <b>Yaenette Dixon-Mah</b>	14
9	<i>Alternative Methods for the Collection of Spat from the Atlantic Oyster (Crassostrea virginica)</i> <b>Deon Flowers</b>	21
10	<i>Linear Density Analysis of International Flax Fibers to Improve Airflow Methods</i> <b>Monica Fripp</b>	35
11	<i>Anonymous Electronic Payment System</i> <b>Sherita Gee</b>	31
12	<i>Intro to Basic Labview</i> <b>Anthony Gibbs</b>	30
13	<i>Crystallization and Structure Determination of Adenomatous Polypsis Coli Protein and the MAPRE Gene Products EBI, RPI and EBF3</i> <b>Kamila Gomez</b>	9

	<i>Isolation and Enumeration of Clostridium Perfringens Lytic Bacteriophage with Membrane Filtration</i>	
14	<b>Tiana Gordon</b>	23
	<i>Immunolocalization of Prx1 Protein during Large Vessel Development</i>	
15	<b>Ebony Hilton</b>	29
	<i>Dynamic Modeling and Simulation of Methanol Reformers</i>	
16	<b>Cindi Hyman &amp; Sharneca Robinson</b>	36
	<i>Mars: Its Colonization</i>	
17	<b>Dike B. Iroha</b>	1
	<i>Programming a Multi-Parameter Microwave Sensor Prototype</i>	
18	<b>Henry Jenkins</b>	34
	<i>ARS 20<sup>th</sup> Century Paper Age to 21<sup>st</sup> Century Electronic Age</i>	
19	<b>Bryan Knight</b>	42
	<i>Women in Science and Engineering: Are Principals in Key?</i>	
20	<b>Latresa McCallum</b>	41
	<i>The Effects of Endotoxing Blockade on a Lethal Model of Ischemial Reperfusion</i>	
21	<b>Kiesha McCausland</b>	17
	<i>The Diversity of CYP3A5 Alleles Among African Ethnic Groups</i>	
22	<b>Susan Morvey</b>	11
	<i>Evaluation of a Simplified Assay to Measure Corn Ear Rot caused by the Fungus Fusarium verticillioides</i>	
23	<b>Shalonda Myers</b>	4
	<i>Battery and Fuel Cell Efficiency</i>	
24	<b>William Neely</b>	33
	<i>Use of gyrB to Identify Salmonella Serotypes</i>	
25	<b>Sharene Patterson</b>	15
	<i>Creating and Designing a Database that is Capable of Querying and Data-Mining Isolates that will meet a Specific Set of Characteristics</i>	
26	<b>Latonya Peoples</b>	37
	<i>Estuarine Phytoplankton Community Responses to Fertilizing Nutrient Additions</i>	
27	<b>Delmeshia Pringle</b>	10
	<i>Effects of Air Pollutants on the Respiration Rates of Germination Vegetable Seed Species</i>	
28	<b>Andrea Richardson</b>	19
	<i>Detection, using 16S rRNA PCR, of Bacterial Species in Water and Biofilms Associated with Poultry Flocks</i>	
29	<b>James Richburg</b>	28
	<i>Vertical Transmission of Campylobacter jejuni in Icelandic Poultry Operations</i>	
30	<b>Tiffany Richburg</b>	16
	<i>Analyzing Water Supplies for Trihalomethane Content Using Headspace Solid-Phase Microextraction with Gas Chromatography</i>	
31	<b>Lisa Rogers</b>	6

	<i>Mechanism of Merocyanine 540 (MC 540) Uptake in Lung Cancer Cells</i>	
32	<b>Rashada Ross</b>	8
	<i>Frequency of Cervical Stenosis and Residual Disease Following Loop Electrosurgical Excision Procedure Compared to Cryotherapy for Treatment of Squamous Intraepithelial Lesions</i>	
33	<b>Atyia Sapp</b>	27
	<i>The African-American DNA Roots Project: Y-Chromosome Variation in the Mende and Limba Ethnic Groups</i>	
34	<b>Sheree Sidney</b>	26
	<i>Potential of Merocyanine-540 (MC-540) with an Inhibitor—Chlorodinitrobenzene (CDNB)— in Human Lung Cancer Cells (A-549)</i>	
35	<b>Terica Simpson</b>	5
	<i>An Evolutionary Analysis of Genetic Variation in Chemical Courtship Signals in the Fruit Fly Drosophila Melanogaster</i>	
36	<b>Bethany Smith</b>	22
	<i>Commercial Field Trial Evaluation of Mucosal Starter Culture to Reduce Salmonella Levels Incidences in Broiler Chicks</i>	
37	<b>Nicole Strong</b>	13
	<i>Application of FTIR Technique with the Aid of Silica Based Adsorbents to Determine Fatty Acids in Oils and Fats</i>	
38	<b>Fiona Thomas</b>	7
	<i>C-Reactive Protein Stimulates Matrix Metalloproteinase-1 Expression through Fc Gamma Receptor-Linked Mitogen Activated Protein Kinase in U937 Histiocytes</i>	
39	<b>Takeyla Williams</b>	18
	<i>Use of Bibliographic Database on Agricultural Research</i>	
40	<b>Tiffany Willis</b>	43
	<i>Investigating the Level of Maternal Antibodies Transmitted from Broiler Breeder Hens to their Progeny (Broilers) and Sub Sequent Potential Reduction of Salmonella Infection of the Broiler</i>	
41	<b>Robert Lee Woods, II</b>	20
	<i>Nutrition Information Retrieval in the World Wide Web: Comparisons between General Search Engines and Niche Sites</i>	
42	<b>Samuel Yeaza</b>	40
	<i>Detecting Total Dietary Fiber Content Using a Combination of Analytical and Technological Methods</i>	
43	<b>Tony Ziegler</b>	3



**Oral Presentations**  
1:30 p.m. – 3:30 p.m.

Conference Room:  
Physical & Chemical Sciences

Room 408:  
Engineering

Room 132:  
Biological Sciences I

4<sup>th</sup> Floor Auditorium:  
Biological Sciences II

Room 407:  
Mathematics & Computer Science

**Oral Presentations**  
**Conference Room**  
**1:30 p.m. – 3:30 p.m.**  
**Physical & Chemical Sciences**

Time	Presenter Title	Abstract #
1:30 – 1:40	<b>Dike B. Iroha</b> <i>Mars: Its Colonization</i>	1
1:40- 1:50	<b>LeAndria Dingle</b> <i>Molecular Physiology of Mineral Uptake: The Role of Nicotianamine in Iron Transport Mechanism and Plant Development</i>	2
1:50 – 2:00	<b>Tony Ziegler</b> <i>Detecting Total Dietary Fiber Content Using a Combination of Analytical and Technological Methods</i>	3
2:00 – 2:10	<b>Shalonda Myers</b> <i>Evaluation of a Simplified Assay to Measure Corn Ear Rot caused by the Fungus Fusarium verticillioides</i>	4
2:10 – 2:20	<b>Terica Simpson</b> <i>Potential of Merocyanine-540 (MC-540) with an Inhibitor— Chlorodinitrobenzene (CDNB)— in Human Lung Cancer Cells (A-549)</i>	5
2:20 – 2:30	<b>Lisa Rogers</b> <i>Analyzing Water Supplies for Tribalomethane Content Headspace Solid-Phase Microextraction with Gas Chromatography</i>	6
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2:50 – 3:00	<b>Kamila Gomez</b> <i>Crystallization and Structure Determination of Adenomatous Polyposis Coli Protein and the MAPRE Gene Products EBI, RPI and EBF3</i>	9

**Oral Presentations**  
**Room 132**  
**1:30 p.m. – 3:30 p.m.**  
**Biological Sciences I**

Time	Presenter <i>Title</i>	Abstract #
1:30 – 1:40	<b>Delmeshia Pringle</b> <i>Estuarine Phytoplankton Community Responses to Fertilizing Nutrient Additions</i>	10
1:40 – 1:50	<b>Susan Morvey</b> <i>The Diversity of CYP3A5 Alleles Among African Ethnic Groups</i>	11
1:50 – 2:00	<b>Tara Brooks</b> <i>Effects of Air Pollutants on the Lipid Content of Germinating Vegetables Seed Species</i>	12
2:00 – 2:10	<b>Nicole Strong</b> <i>Commercial Field Trial Evaluation of Mucosal Starter Center to Reduce Salmonella Levels Incidences in Broiler Chicks</i>	13
2:10 – 2:20	<b>Yaenette Dixon-Mah</b> <i>Neurovascular Plasticity after Focal Ischemia in Mouse Whisker Barrel Cortex</i>	14
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2:30 – 2:40	<b>Tiffany Richburg</b> <i>Vertical Transmission of Campylobacter jejuni in Icelandic Poultry Operations</i>	16
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2:50 – 3:00	<b>Takeyla Williams</b> <i>C-Reactive Protein Stimulates Matrix Metaloproteinase-1 Expression through Fe Gamma Receptor Protein Kinase in U937 Histiocytes</i>	18
3:00 – 3:10	<b>Andrea Richardson</b> <i>Effects of Air Pollutants on the Respiration Rates of Germination Vegetable Seed Species</i>	19

**Oral Presentations**  
 4<sup>th</sup> Floor Auditorium  
 1:30 p.m. – 3:30 p.m.  
 Biological Sciences II

Time	Presenter <i>Title</i>	Abstract #
1:30 – 1:40	<b>Roberts Woods, II</b> <i>Investigating the Level of Maternal Antibodies Transmitted from Broiler Breeder Hens to their Progeny (Broilers) and Subsequent Potential Reduction of Salmonella Infection of the Broiler</i>	20
1:40 – 1:50	<b>Deon Flowers</b> <i>Alternative Methods for the Collection of Spat from the Atlantic Oyster (Crassostrea virginica)</i>	21
1:50 – 2:00	<b>Bethany Smith</b> <i>An Evolutionary Analysis of Genetic Variation in Chemical Courtship Signal in the Fruit Fly Drosophila Melanogaster</i>	22
2:00 – 2:10	<b>Tiana Gordon</b> <i>Isolation and Enumeration of Clostridium Perfringens Lytic Bacteriophage with Membrane Filtration</i>	23
2:10 – 2:20	<b>Kristen Charles</b> <i>Evaluation of Two Campylobacter Testing Methods Using Campy Line Agar</i>	24
2:20 – 2:30	<b>Travis Chavis</b> <i>Differential Expression of Toll-like Receptors on the Hepatocyte Membrane</i>	25
2:30 – 2:40	<b>Sheree Sidney</b> <i>The African-American DNA Roots Project: Y-Chromosome Variation in the Mende and Limba Ethnic Groups</i>	26
2:40 – 2:50	<b>Atyia Sapp</b> <i>Frequency of Cervical Stenosis and Residual Disease Following Loop Electrosurgical Excision Procedure Compared to Cryotherapy for Treatment of Squamous Intraepithelial Lesions</i>	27
3:00 – 3:10	<b>James Richburg</b> <i>Detection, using 16S rRNA PCR, of Bacterial Species in Water and Biofilm Associated with Poultry Flocks</i>	28
3:20 – 3:30	<b>Ebony Hilton</b> <i>Immunolocalization of Prx1 Protein during Large Vessel Development</i>	29



# Oral Presentations

Room 408

1:30 p.m. – 3:30 p.m.

Engineering

Time	Presenter <i>Title</i>	Abstract #
1:30 – 1:40	<b>Anthony Gibbs</b> <i>Intro to Basic Labview</i>	30
1:40 -1:50	<b>Sherita Gee</b> <i>Anonymous Electronic Payment System</i>	31
1:50 -2:00	<b>Joseph Bonivel</b> <i>Camless Engine Research</i>	32
2:00 – 2:10	<b>William Neely</b> <i>Battery and Fuel Cell Efficiency</i>	33
2:10 – 2:20	<b>Henry Jenkins</b> <i>Programming a Multi-Parameter Microwave Sensor Prototype</i>	34
2:20 – 2:30	<b>Monica Fripp</b> <i>Linear Density Analysis of International Flax Fibers to Improve Airflow Methods</i>	35
2:30 -2:40	<b>Cindi Hyman &amp; Sharneca Robinson</b> <i>Dynamic Modeling and Simulation of Methanol Reformers</i>	36

**Oral Presentations**  
**Room 407**  
**1:30 p.m. – 3:30 p.m.**  
**Mathematics & Computer Science**

Time	Presenter <i>Title</i>	Abstract #
1:30 – 1:40	<b>LaTonya Peeples</b> <i>Creating and Designing a Database that is Capable of Querying and Data-Mining Isolates that will meet a Specific Set of Characteristics</i>	37
1: 40 – 1:50	<b>Tufuantsi Daniel</b> <i>An Investigation of Poset Rankings of Graphs-The Case of Semi-Ranking by the V Partial Order</i>	38
1:50 – 2:00	<b>Ricky Carreker</b> <i>Data and Image Manipulation to Enhance the Development of State of the Art Scientific Presentations</i>	39
2:00 – 2:10	<b>Samuel Yeaza</b> <i>Nutrition Information Retrieval in the World Wide Web: Comparisons between General Search Engines and Niche Sites</i>	40
2:10 – 2:20	<b>Latresa McCallum</b> <i>Women in Science and Engineering: Are Principals the key?</i>	41
2:20 – 2:30	<b>Bryan Knight</b> <i>ARS 20<sup>th</sup> Century Paper Age to 21<sup>st</sup> Century Electronic Age</i>	42
2:30 – 2:40	<b>Tiffany Willis</b> <i>Use of Bibliographic Database in Agricultural Research</i>	43

# ABSTRACTS

Abstract #

Presenter<sup>1</sup> and Mentor<sup>2</sup>

<sup>1</sup>Home Institution; Classification  
Research Site

**Title**  
Abstract

# Physical & Chemical Sciences

1

Dike B. Iroha<sup>1</sup>, Dr. Greg Siragusa & Johnna Garrish<sup>2</sup>

<sup>1</sup> Claflin University

William-Russell and Johnson, Inc

## Mars: Its Colonization

For a long time now, scientists have been devising a means of exploring Planet Mars to make it habitable for humans to live in. The objective of my research is to work out a plan that makes existence of life on planet mars possible. Once this is done, it will be introduced to middle school students to help prepare them for a future engineering career. Finding out possible ways to colonize Mars would impact global change on Earth. Colonizing Mars means that another human civilization would be established. In order to start one, however, a transportation of humans from Earth would take place and less people would be living on planet Earth. As a result, with fewer humans on Earth, less people would utilize resources and thus, conserve those that are on Earth. This aspect would dramatically effect global change. There would be less pollution, less consumption of natural resources, and all together less human transactions that cause harmful effects on Earth. In addition, the colonization of Mars would promote major technology advancements. The new technology designed for Mars missions could possibly benefit Earth as well. The benefits would also lead to enhancing global change. For life to exist in mars, certain microbes would be used. One of such microbe is the cyanobacteria Chroococciopsis. The last conclusion would be under the realm of experiments. If a proper biome or facility is constructed, certain experiments not permitted on Earth or those that would be harmful to the Earth's environment could possibly be conducted on Mars.

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LeAndria M. Dingle<sup>1</sup>, Dr. Erin Connolly<sup>2</sup>

<sup>1</sup> University of South Carolina, Senior

## Molecular Physiology of Mineral Uptake; The Role of Nicotianamine in Iron Transport Mechanisms and Plant Development

Iron deficiency is the most common human nutritional disorder in the world today, affecting approximately one half of the world's population. Iron homeostasis in plants is of particular interest since plants are the main dietary source of essential nutrients for much of the human population. Recent studies have suggested that nicotianamine, a non-proteinogenous amino acid, found in plants such as *Arabidopsis thaliana*, functions to regulate the internal transport of iron and other metals.

Our long term goal is to design genetically engineered crops that over-accumulate iron thus having a higher nutritional value. To this end we are examining the role of nicotianamine in plants. The NAS1 gene encodes nicotianamine synthase (NAS). Nicotianamine synthase is an enzyme that is necessary for the biosynthesis of nicotianamine, in Arabidopsis. In order to elucidate the function of nicotianamine synthase, we have constructed lines that over-express NAS1. Currently, we are performing northern analysis to examine NAS1 RNA levels in plants that over-express the NAS1 gene. The function of the NAS1 gene will also be knocked out (KO) using a TDNA insertion of *Agrobacterium tumefaciens* and by a process called RNA interference. These putative KO lines can be screened to identify homozygous KO lines using the Polymerase Chain Reaction.

NAS over-expression may result in the over accumulation of iron in certain plant tissues but not others, thus identifying the NAS1 gene to be responsible for iron transport to that particular area of the plant. By decreasing NAS expression in Arabidopsis using an NAS1 KO, the function of the NAS1 gene and the role of NA can be determined in iron transport.



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Tony Zeigler<sup>1</sup>, Dr. Mukti Singh and Dr. Sandra E. Kays<sup>2</sup>  
<sup>2</sup> Claflin University, Junior  
USDA-ARS, Athens GA

### **Detecting Total Dietary Fiber Content Using a Combination of Analytical and Technological Methods**

Near Infrared Spectroscopy (NIRS) is being investigated as a faster method of detecting the total dietary fiber in mixed food products in comparison with the Association of Official Analytical Chemists (AOAC) method. Mixed foods are foods containing different substances such as meats, vegetables and wheat. Dr. Singh Mukti, Dr. Sandra Kays and I, Tony Zeigler, are seeking a more rapid path to detect this dietary fiber and obtain the same or better accuracy than the AOAC method. The mixed food samples were brought from a nearby grocery store. Next, the samples were homogenized, defatted with petroleum ether using the Soxhlet Apparatus, dried and grounded. After the samples were dried and ashed from the AOAC method they were put into the LECO FP2000 where the machine calculated the %N and the % Protein. The NIR spectroscopy uses light rays to produce a reflectance spectrum containing the percentage of all the fiber in the mixed food products. The samples were placed in cells and then placed inside the NIR spectroscopy 6500. Then, we scanned the same cell in the Vector 22/N NIR Spectroscopy. Finally, we are using the NIR spectroscopy to compile a model using statistical methods that can be run through the spectroscopy to detect the total dietary fiber in the mixed foods. This model will promote a faster and environment friendly method of detecting all the nutrients in the foods we eat today providing an easier work for other food scientists.

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Shalonda Myers<sup>1</sup>, Dr. Anthony Glenn<sup>2</sup>  
<sup>1</sup> Claflin University, Junior  
USDA-ARS, Athens, GA

### **Evaluation of a simplified assay to measure corn ear rot caused by the fungus *Fusarium verticillioides***

Food safety is an important issue faced by farmers and food processors. One major concern is the contamination of food by fungal toxins (mycotoxins). The fumonisins are a group of mycotoxins commonly contaminating corn food and feed. Fumonisins can cause several diseases on animals and humans. The fungus *Fusarium verticillioides* is the major producer of fumonisins and also causes disease on corn. Ear rot is a common disease caused by this fungus and is directly correlated with amount of fumonisin contamination. As an extension of current research examining the biology of *F. verticillioides* and its ability to infect and colonize corn, we have performed a corn ear assay to measure the virulence of the fungus. The purpose of this project is to test different strains for their ability to infect ears. Since genetic variation exists between the fungal strains, we ultimately want to know what genes are necessary to cause ear rot. Corn ears were surface sterilized and inoculated with eight strains and a water control. The corn ears were placed in sterile containers and incubated (30 C) for 6-7 days. Colonization was then measured and kernels were removed from the ear to extract DNA for quantification by PCR. Results of this assay varied from field experiment data. Less virulent strains in the field experiment showed more fungal growth in the lab assay, for example. The difference in the two experiments may be due to variation in the inoculation procedures. Therefore, future experiments should include the same procedures for both.

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Terica Simpson <sup>1</sup>, Dr. Linda Jones & Rashada Ross <sup>2</sup>  
<sup>1</sup> College of Charleston  
College of Charleston, Charleston SC

**Potential of Merocyanine-540 (MC-540) with an Inhibitor—Chlorodinitrobenzene (CDNB)—in Human Lung Cancer Cells (A-549)**

Chemotherapy now has significant limitations due to the development of multi-drug resistance in tumor cells. This study is based specifically on the multi-drug resistance of human lung cancer cells (A-549). Merocyanine 540 is a dye to which A-549 cancer cells are resistant. The first task was to use potassium cyanide (KCN) to determine whether the resistance of the cells involved active transport. The next objective was to determine whether the mechanism of resistance is due to the presence of MRP1 transporters, which are known to be in the cells. Chlorodinitrobenzene was then used as an inhibitor of the MRP1 transporter found in the human lung cancer cells A-549. The combination of the MC-540 and CDNB will be able to evaluate if MRP1 is one of the many transporters causing multi-drug resistance in human lung cancer cells A-549.

**Aim:** To investigate the effective uptake of merocyanine 540 using the inhibitors potassium cyanide and chlorodinitrobenzene in human lung cancer cells A-549.

**Method:** Confocal fluorescence microscopy. The study is still in progress.

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Ms. Lisa Nicarla Rogers <sup>1</sup>, Dr. Anthony Rizzuti <sup>2</sup>  
<sup>1</sup>Clafin University, Sophomore  
Clafin University

**Analyzing Water Supplies for Trihalomethane Content Using Headspace Solid-phase Microextraction with Gas Chromatography**

In many water treatment plants, chlorination is the main technique used for the purification of water for public consumption. This process however leads to the formation of Trihalomethanes, which have been identified as cancer causing agents known as carcinogens. In this study, samples of both well (ground) and city (treated surface) water were taken from the city of Orangeburg, South Carolina and surrounding areas. The samples were analyzed for trihalomethane content using Solid-Phase Microextraction with gas Chromatography. The preliminary results of this research indicate that trihalomethane content levels were higher in city water samples compared to well water samples. Although this is true, city water samples are expected to fall below acceptable EPA trihalomethane limits.

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Fiona Thomas<sup>1</sup>, Dr. Kalapathy<sup>2</sup>  
<sup>1</sup>Claflin University, Sophomore  
Claflin University

### **Application of FTIR technique with the aid silica based adsorbents to determine fatty acids in oils and fats**

Fatty acids are a result of the hydrolysis of oils and fats. When oxidized, they produce harmful products such as peroxides and carbonyl compounds. FTIR (Fourier transform infrared spectroscopy), with diffuse reflectance sampling mode, can be used to determine the amount of fatty acid in oils and fats. Most of the major fatty acids are liquids, and can be adsorbed on silica for diffuse reflectance measurements. In order to obtain maximum adsorption, different concentrations of fatty acids (oleic acid in hexane), are mixed with silica for varying lengths of adsorption time. These samples are mixed with Potassium Bromide (KBr) and FTIR spectra are obtained. Fatty acids contain the carbonyl group (C=O) which absorbs infrared radiation at about  $1720\text{cm}^{-1}$ . By measuring the height of this peak, the amount of C=O and hence the amount of fatty acid can be estimated. An unknown oil sample will be analyzed for fatty acid content. A titration method will be used to confirm the results produced by the FTIR method. Since the FTIR method is rapid and simple, it can be utilized in the food industry to monitor the fatty acid content in food products.

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Rashada T. Ross<sup>1</sup>, Linda R. Jones<sup>2</sup>  
<sup>1</sup> College of Charleston, Senior  
College of Charleston

### **Mechanism of Merocyanine 540 (MC540) Uptake in Lung Cancer Cells**

In photodynamic therapy a dye is injected into a tumor followed by illumination of the tumor by visible light. Neither the dye nor the light are damaging alone, but together they cause singlet oxygen to be produced within the tumor. Merocyanine 540 (MC540) is used experimentally for the purging of bone marrow for leukemia patients. It is known that L1210 mouse leukemia cells are sensitive to this dye and A549 human lung cancer cells are resistant to MC540; however the mechanism of selectivity has not been established. Our hypothesis is that A549 human lung cancer cells have multidrug resistant transporters that inhibit the accumulation of multidrug substrates in that particular cell. Chlorodinitrobenzene (CDNB) is used as an inhibitor of MRP1 transporters. Experimental methods included measurement of fluorescence in intact cells with a spectrofluorimeter. Preliminary results indicate that MC540 may be a substrate of MRP1. Further studies will be done with leukemia cells and normal bone marrow cells.

# Biological Sciences I

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Kamila Gomez<sup>1</sup>, Dr. Lukasz Lebioda<sup>2</sup>.

<sup>1</sup>Clafin University, Freshman

Department of Chemistry & Biochemistry, University of South Carolina

## **Crystallization and Structure Determination of Adenomatous Polyposis Coli protein and the MAPRE gene products EB1, RP1, and EBF3**

The primary purpose of this project is to determine the 3-dimensional structure of the proteins for both Adenomatous Polyposis Coli (APC) tumor suppressor gene and those of the MAPRE gene family, which includes EB1, RP1 and EBF3. The reason behind this experiment is to establish the relationship between EB1 and APC, since wild-type APC includes a binding site for EB1 (Bodmer et al., 2001; van ES et al., 2001; Goss et al., 2000; Su et al., 1995; Polakis 1995; Lu et al., 2001; Morrison et al., 1998; Mimoru Kiyosue et al., 2000; Nathke et al., 1996; Berrueta et al., 1998; Pellman 2001). Research has found that upon mutation of APC, the C-terminal end is truncated and thus causes a loss of the EB1 binding site (Morrison et al, 2000). This is of particular importance as APC plays the role of a regulator protein that binds to other proteins in the WNT signaling pathway. This is a pathway that activates cell proliferation. If APC does not bind to particular proteins, the pathway is disrupted and this has been linked to the development of particular human cancers (Nakamura, 1993; Kinzler and Vogelstein, 1996). In order to achieve the primary goals of this project, the plasmid DNA containing the corresponding gene products were extracted from vectors containing a GST-tag and purified. The cDNA inserts encoding for the gene products were then removed and spliced into vectors containing a 6X cleavable HIS-tag which should allow for more efficient expression and purification.

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Delmeshia M. Pringle<sup>1</sup>, Dr. John B. Williams<sup>2</sup>

<sup>1</sup>Morris College, Junior

Lab: Hodge Hall Science Building, South Carolina State University; Field: ACE Basin estuary, Bennetts Point, S.C.

## **Estuarine phytoplankton community responses to fertilizing nutrient additions.**

Typically, phytoplankton communities respond with increased growth and reproduction to nutrient additions. When these additions exceed ecosystem homeostatic limits, detrimental impacts can result. Excessive algal growth can form blooms, resulting in fish kills, human health issues, and reduced water quality. The several algal divisions within the phytoplankton respond differently to nutrient elevations. Some species may rise rapidly in concentrations, while other species are unaffected. However other species may be drastically reduced. These changes raise important management issues including concerns about human health and seafood viability, as well as more subtle impacts like food chain alterations. The primary objective of this study was to determine the relative effects of nitrate and phosphate additions to phytoplankton communities in two different salinity regimes. Phytoplankton counts were conducted using inverted microscope techniques patterned after the Utermohl settling method. The experimental design utilized control treatments of ambient nutrient levels along with experimental treatments testing the simple and combined effects of one level nitrate and one level of phosphate. When possible, phytoplankton species were identified to genus and density changes were compared statistically to determine the relative responses of the communities to nitrogen versus phosphorus additions. Implications from this study will help resource managers better plan fertilizing activities from communities and agriculture in the coastal zone.



Susan Morvey<sup>1</sup>, Dr. Ely<sup>2</sup>  
<sup>1</sup>University of South Carolina

### **The Diversity of CYP3A5 Alleles Among African Ethnic Groups**

The enzyme Cytochrome P450 (CYP), which acts in drug metabolism, influences circulating steroid levels and also responds to metabolized drugs. There are approximately 55 different CYP genes present in the human genome that are classified into different families and subfamilies on the basis of sequence homology. An allele of CYP3A4 gene, CYP3A4\*1B is expressed among both African Americans and Caucasians. Since Africans are more genetically diverse than Caucasians, we hypothesized that the distribution of CYP3A4\*1B will vary markedly among African ethnic groups. To test this hypothesis, samples were obtained from two different ethnic groups from Sierra Leone, Limba and Temne. These two ethnic groups were chosen because of the diversity of their mitochondrial DNA. DNA from each sample was amplified and tested. A comparison of the results for the two ethnic groups will be presented.

Tara Brooks<sup>1</sup>, Dr. Ajoy Chakrabarti,<sup>2</sup>  
<sup>1</sup>Morris College, Senior  
South Carolina State University

### **Effects of Air Pollutants on the Lipid Content of Germinating Vegetable Seed Species**

The research attempts to study the effects of air pollutants on the lipid content of germinating seeds. The gases used are Carbon Monoxide (CO), Sulfur Dioxide (SO<sub>2</sub>) and Nitrogen Dioxide (NO<sub>2</sub>) in sealed glass chambers. The ten commonly grown seed species used are: bell pepper, squash, tomato, collards, mustard, eggplant, lima bean, black eyed pea, spinach, and pumpkin. Seed lipid can influence two major aspects: growth of the developing embryo and the oil that is produced for consumers. Thus air pollutants may affect agricultural production and the economy. Observations received as of yet exhibit that the lipid content is promoted in bell pepper seed species by nitrogen dioxide; in black-eye pea and mustard by carbon monoxide; in bell pepper by sulfur dioxide and in lima bean and spinach by the control. As of yet results indicate that the lipid percentage range 5-35% in all seed species.

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Nicole Strong<sup>1</sup>, Dr. Joseph S. Bailey, Mr. Douglas Cosby, Mrs. Lalla Tanner<sup>2</sup>  
<sup>1</sup> South Carolina State University, Sophomore  
ARS, Athens GA

### **Commercial Field Trial Evaluation of Mucosal Starter Culture to Reduce Salmonella Levels Incidence in Broiler Chicks**

This study is used to determine the effectiveness of Mucosal Starter Culture (MSC) in reducing the levels salmonella in broiler chickens. Newly hatched chicks were used in this study because this will be where intervention is possible due to the young chicks having an immature gut micro flora. As a result, MSC is capable of giving the chick a mature gut flora, which should lead to low levels of salmonella colonizing the gut. Giving the chicks MSC orally through the use of a syringe starts this process. The next day, the chickens received salmonella by using a syringe. The chicks were grown in identically constructed and equipped triplicate pens. A week later, the chicks are sacrificed and tested for salmonella by the removal of the ceca. A protection factor of three is acquired if the MSC is effective.

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Yaenette N. Dixon-Mah<sup>1</sup>, Dr. Ling Wei<sup>2</sup>  
<sup>1</sup> College of Charleston, Senior  
MUSC, Charleston, SC

### **Neurovascular Plasticity after Focal Ischemia in Mouse Whisker Barrel Cortex**

Stroke is one of the leading causes for human death and disability. The present investigation tests the hypothesis that enhance input of signals to the whisker-barrel pathway after focal ischemia to the barrel cortex increases neurogenesis and angiogenesis and there by improving functional recovery. Adult Wistar mice structure on the right side of the barrel cortex. Multiple branches of the middle cerebral artery that supply blood floe to the barrel cortex were permanently ligated, followed by 30-minute occlusion of both common carotid arteries (Wei et al., Stroke 26:1456-1462, 1995; 32:2176-2184, 2001). Cell proliferation was determined using bromodexyuridine (BrdU), a DNA synthesis marker. Three days after ischemia, BrdU was injected twice daily for 5 – 19 days before sacrifice. At the same time, the whiskers ipsilateral to the ischemic area were trimmed so the animals were forced to use the contralateral whiskers whose afferent input projected to the damaged cortex. To ensure enhanced activity, the contralateral whiskers were manually stimulated three times a day. After sacrifice, brain sections were imaged using the Olympus BX61 fluorescent microscope for counting and comparing the numbers of neurons and blood vessels. Mice receiving whisker stimulation showed more BrdU positive nuclei; proliferation was accompanied by the presence of growth-associated proteins GAP-43 and VEGF, by immunostaining. Thus, whisker stimulation in mice, being analogous to physical therapy in humans, may promote neurogenesis, as well as anglogenesis to then improve functional recovery after ischemic insult to the brain.

Sharene Patterson<sup>1</sup>, Dr. Jean Guard Petter and Cesar Morales<sup>2</sup>  
<sup>1</sup>Voorhees College  
 USDA-ARS, Athens, GA

### Use of *gyrB* to identify *Salmonella* serotypes

*Salmonella enterica* is the second most common cause of foodborne illness in the United States. Among the 2,449 known *Salmonella* serotypes, Typhimurium and Enteritidis are the two most common causes of foodborne illness and they account for half of all cases of salmonellosis. Typhimurium is associated with carcass contamination, whereas Enteritidis contaminates the internal contents of the hen's egg. Numerous typing methods have been used to differentiate *Salmonella* serotypes: ribotyping, macrorestriction analysis of genomic DNA, plasmid profiling and antiserum serotyping, macrorestriction analysis time-consuming and expensive. The objective of this research is to develop a *Salmonella* serotypes. Gyrase Subunit (*gyrB*)

Is one of the target sequences for believed to be the best sequence of choice for typing due to its low mutational rate and along with probe GSE-P for using the *gyrB* sequence to differentiate *Salmonella* serotypes, with special emphasis on the detection of serotypes Typhimurium and Enteritidis. Further objectives for the project are to differentiate serovar Enteritidis at the phenotypic level.

Tiffany M. Richburg<sup>1</sup>, Dr. Norman J. Stern, Dr. Kenneth Callicott, Dr. Kelli Hiett, Susan Brooks, and  
 Latoya Wiggins<sup>2</sup>  
<sup>1</sup> South Carolina State University, Sophomore  
 USDA-ARS, Athens, GA

### Vertical Transmission of *Campylobacter jejuni* in Icelandic Poultry Operations

*Campylobacter jejuni* is the most common bacterial cause of acute gastroenteritis (food poisoning) in developing countries, and poultry is the major source of campylobacteriosis. In order to design effective intervention strategies to prevent broiler chickens from being colonized by *Campylobacter*, the sources of transmission need to be established. One hypothetical source is by vertical transmission, where *Campylobacter* are passed from hen to chick. The Icelandic industry presents a unique opportunity to study vertical transmission since all breeder eggs are transported from Sweden, hatched and raised in Iceland, with no contact between parent and offspring. In order to test the hypothesis regarding vertical transmission, we sequenced approximately 400 nucleotide (nt) from the flagellin A gene to phylogenetically type *Campylobacter* isolates recovered from parent flocks in Sweden and their offspring in Iceland. Sequences were assembled using the Lasergene<sup>TM</sup> program and aligned using ClustalX<sup>TM</sup>. Phylogenetic analysis was performed using the Neighbor Joining algorithm of PAUP\* (Phylogenetic Analysis Using Parsimony).

Kiesha McCausland<sup>1</sup>, Dr. Kenneth D. Chavin<sup>2</sup>  
<sup>1</sup> College of Charleston, Junior  
 MUSC, Charleston, SC

### **The Effects of Endotoxin blockade on a lethal model of Ischemia/Reperfusion**

Our focus is to discover the effects of using fatty or steatotic livers during transplants. With the use of warm ischemia model, we are able to see the build up of endotoxins known as LPS (Lipopolysaccharides) during ischemia causes injury to the liver during the reperfusion stage of the transplant. LPS is a key component of the cell wall of gram-negative bacteria. Ob/ob mice are more sensitive to LPS than their lean counterparts. We sought to investigate the effects of endotoxin blockade during Ischemia/Reperfusion in steatotic mice.

Male ob/ob and lean mice were administered 200µg anti-LPS mAb i.v. or isotype control mAb. Mice were subjected to 15 minutes of warm ischemia by porta-hepatis occlusion, followed by 24 hrs of reperfusion. Mice were sacrificed, blood and tissue was collected for analysis of UCP-2 content, ATP content, ALT, AST, endotoxin level and immunohistochemistry.

Takeyla Williams<sup>1</sup>, Yan Huang<sup>2</sup>  
<sup>1</sup> College of Charleston, Junior  
 MUSC, Charleston, SC

### **C-Reactive Protein Stimulates Matrix Metalloproteinase-1 Expression through Fc Gamma Receptor-Linked Mitogen-Activated protein Kinase in U937 Histiocytes**

Atherosclerosis is a common acute coronary syndrome that results from the build up of lipids in the artery, which leads to a heart attack. The stability of an atherosclerotic plaque is determined by the thickness of the fibrous cap surrounding the lipid core of the plaque. A stable plaque has a thick fibrous cap protecting the lipid core from contact with the blood; however, a vulnerable plaque has a relatively large amount of lipids and a thin fibrous cap separating the lipid core from the blood. The enzyme Matrix Metalloproteinase-1 (MMP-1) plays an active role in degrading collagen within the fibrous cap. We have hypothesized that CRP stimulates MMP-1 expression by human macrophages and thus plays a role in plaque vulnerability. Our results show that 100 µg/ml of CRP stimulates MMP-1 secretion from U937 macrophage-like cells by 3-5 folds and had no effect on TIMP-1 secretion. The stimulation of MMP-1 secretion by CRP is concentration-dependent. Furthermore, our data showed that PD98059, an inhibitor of the extracellular signal-regulated kinase (ERK) signaling pathway, inhibits CRP-stimulated MMP-1 secretion by 90%, suggesting that CRP stimulates MMP-1 secretion through ERK pathway. Finally, our Western blot demonstrates that CRP stimulates the phosphorylation of ERK, mainly ERK2. Taken together, this study has demonstrated that CRP upregulates MMP-1 expression in U937 macrophage-like cells. Considering the role of MMP-1 in weakening of atherosclerotic plaques, this study suggests that CRP may contribute to plaque vulnerability.

Andrea Richardson<sup>1</sup>, Dr. Ajoy Chakrabarti<sup>2</sup>  
<sup>1</sup>Midlands Technical College, Junior  
South Carolina State University

### **Effects of Air Pollutants on the Respiration Rates of Germinating Vegetable Seed Species**

The effects of pollutant gases on the respiration rates of ten highly consumed vegetable seed species in South Carolina are being studied. The experimental seed species are spinach, collards, mustards, squash, pumpkin, lima bean, black-eye pea, eggplant, tomato, and bell pepper. The three gases utilized throughout this experiment are carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), and sulfur dioxide (SO<sub>2</sub>). The fourth atmosphere used in this experiment is the laboratory environment, the control. Air pollutants are known to affect the life processes and soft tissues in organisms. Respiration is the source of energy production in living cells and is vital for physiological processes such as germination. Results received as of yet exhibit that the average volume of oxygen consumed ranges from 0.03cc to 0.27cc/ minute in control, 0.02cc to 0.09cc/minute in CO, 0.02cc to 0.17cc/ minute in NO<sub>2</sub> and 0.01cc to 0.05cc/minute in SO<sub>2</sub> sulfur dioxide.

# Biological Sciences II

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Robert Lee Woods, II<sup>1</sup>, Nelson Cox, Debbie Posey and Jason Richardson<sup>2</sup>  
<sup>1</sup>South Carolina State University, Sophomore  
USDA-ARS, Athens, GA

## **Investigating the Level of Maternal Antibodies Transmitted from Broiler Breeder Hens to their Progeny (Broilers) and Subsequent Potential Reduction of *Salmonella* Infection of the Broiler.**

The level of *Salmonella* antibodies passed from broiler breeder hens to their progeny is a research project that focuses on three main objectives. The first objective is effect of three different vaccination protocols on the level of *Salmonella* infection in broiler breeder hens. The second objective is effect of broiler breeder hen hyper immunization on maternal yolk antibodies and effect on the subsequent progeny. The final objective is effect of three different vaccination protocols during grow out on flock performance measured by egg production, feed conversion and mortality rate on a flock placed in a commercial situation. Broiler breeder hens were tested for *Salmonella* levels at day of age. The birds were vaccinated at 1 d, 3 wks, 11 wks, 14 wks, 17 wks and 18 wks of age.

In this trial, the focal point is on the outcome of broiler breeder hyper immunization on maternal egg yolk antibodies and effect on progeny. At 28 wks of age, 10% of the broiler breeder hens were wing-bled and a crop lavage executed to determine antibody levels from the three treatments administered early life and a control flock. In addition, five eggs per treatment and control were randomly collected for determination of egg yolk antibody levels. At 28 wks of age, 264 eggs per treatment (n=3) and control were collected and incubated. At day of hatch, 80 (n=20) chicks from each treatment and control were randomly assigned to floor pens for broiler grow-out. At one week of age, the ceca will be removed and analysis performed. This project is still ongoing and results are not apparent at this time.

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Deon Flowers<sup>1</sup>, Andy Jennings, Bill Anderson<sup>2</sup>  
<sup>1</sup>College of Charleston, Senior  
USDA-ARS Cotton Quality Research Station

## **Alternative Methods For The Collection of Spat from the Atlantic Oyster (*Crassostrea virginica*)**

We investigated the efficiency of collecting juvenile oysters by using four different types of stakes. Two different areas in South Carolina waters were chosen as sites to place stakes; one with established oyster beds, R-183, and one without, S-206. Out of the two hundred stakes placed within the sites, five of each different type was brought back to the labs to be analyzed. A small amount of spat was observed on the stakes from S-206. It is believed that accumulation of spat on the stakes is related to the areas in which they are placed; juvenile oysters are more likely to attach to stakes placed in areas with established oyster reefs. Further analysis will be discussed once analysis of R-183 is complete.

Bethany Smith<sup>1</sup>, Dr. David Scott<sup>2</sup>  
<sup>1</sup> Benedict College, Sophomore  
 South Carolina State University

**An evolutionary analysis of genetic variation in chemical courtship signals in the fruit fly  
*Drosophila melanogaster***

Intra-species variation in courtship behavior of *Drosophila melanogaster* has been used in mapping the genetic elements controlling the role of sex pheromones in the fruit fly (Scott, 1994). Hydrocarbons found on the male cuticle are known to act as chemical signals affecting the mating process. In order to explore the evolutionary differences in courtship behaviors in different strains of *Drosophila melanogaster*, we have collected local strains of the fruit fly from two separate locations in the Orangeburg, SC area. We will be comparing differences between the strains we have isolated (strain HH and AA) with the commonly used lab strains (Canton-S, Tai-Y, and Florida-9). After breeding the newly isolated lines, we will analyze their hydrocarbon profiles on a Gas Chromatograph (GC), and compare them to the well-characterized lab strains. Our focus will be on the hydrocarbons, 7-tricosene and 7-pentacosene, which act as male pheromones responsible for female mate discrimination. Newly isolated wild strains with significant differences in these molecules will be selected and their courtship behavior analyzed. In parallel, the presence or absence of the P-element transposons in the selected strains will be determined by genetic crossing with lab strains that don't contain P-elements. The same will also be confirmed by molecular genetic procedures, namely Southern blotting. The data obtained from the various experiments will be integrated in an attempt to correlate courtship behavior between different strains of the same species. The long-term goal of the project is to shed light on the evolution of pre-mating isolation mechanisms.

Tiana Gordon<sup>1</sup>, Dr. Greg Siragusa & Johnna Garrish<sup>2</sup>  
<sup>1</sup> South Carolina State University, Sophomore  
 USDA-ARS, Athens, GA

**Isolation and Eni,eration of *Clostridium Perfringens* Lytic Bacteriophage with Membran  
 Filtration**

*Clostridium Perfringens* is an encapsulated, nonmotile rod that tolerates low concentrations of oxygen. It forms a large number of different extracellular products that probably contribute to disease by degrading host tissues. The normal habitat of *Clostridium Perfringens* is the intestine of humans and other animals, and soil is commonly contaminated with its endospores. *Clostridium Perfringens* is the cause of most cases of gas gangrene. Certain strains of *Clostridium Perfringens* are said to be heat resistant endospores causing food poisoning, and others responsible for a severe, gangrenous infection of the intestine.

For this project, the isolation of bacteriophage that are lytic for the bacterium *Clostridium Perfringens* will be done. To accomplish this, continuous sampling of natural materials such as fecal matter (raw sewage, processing plant rinse water, offal rinsates, fecal/cecal/litter slurries, and river water) for these viral agents for potential use as biocontrol agents. In this experiment, the samples which are collected from various sewage plants, must first be filtered, removing large particles and bacteria from them. From there, the bacteria must be measured out into Brain Heart Infusion (BHI), filtered again, and sterilized. The inoculation of BHI tubes are then left to incubate at 37 digress Celsius. After growth, more BHI tubes are inoculated and overlaid into petri dishes. After 16-2- hours the plates are inspected for bacteriophaging. The plated should appear with plaques with gauzy hazing surrounding the host culture. Plates of this nature can be scraped, smeared onto a slide, and observed microscopically for *Clostridium Perfringens*.



Kristen Charles<sup>1</sup>, Dr. Eric Line and Mrs. Susan Mize<sup>2</sup>  
<sup>1</sup> South Carolina State University, Sophomore  
 USDA-ARS, Athens, GA

### **Evaluation of Two Campylobacter Testing Methods Using Campy Line Agar**

Though detection of Campylobacter is difficult, it is very useful once it is obtained. In this study, a comparison between the Biphasic Microtiter method to the standard direct plating method on Campy Line Agar plates is taking place. A portion of 200 ml of each chicken carcass rinse is poured into a sterile container and placed on ice. Four 0.25 ml samples and two 0.1 ml samples are taken from each original carcass rinse and transferred directly to the Campy agar plates. These plates are incubated for up to forty-eight hours at forty-two degrees Celsius. This method is referred to as the Direct Plating Method. In the second method, a ninety-six well plate is filled with 100 mL of a Phosphate Buffered Saline (PBS). 200 mL of the chicken carcass rinses are placed in row one of the PBS. From row 2 through 11 serial dilutions are performed. 100mL of this well diluted solution is then added into ninety-six well plates containing Campy-Line Agar. This process is continued for all of the remaining chicken carcass rinses. These plates are also incubated for up to forty-eight hours at forty-two degrees Celsius. This process is referred to as the Biphasic Microtiter Method. After this process is completed, it is simple to detect whether Campylobacter is present. When Campylobacter comes in contact with triphenyltetrazolium chloride (TTC), which is found in the Campy-Line Agar, a deep red color is adapted by the colonies, making the Campylobacter distinguishable once diluted with the translucent Campy Line Agar.

Travis D. Chavis<sup>1</sup>, Kenneth D. Chavin<sup>2</sup>  
<sup>1</sup> College of Charleston, Sophomore  
 MUSC, Charleston SC

### **Differential Expression of Toll-like Receptors on the Hepatocyte Membrane of Lean and ob/ob mice**

**Background:** Livers with greater than 30% steatosis have a greater than 25% chance of developing primary non-function, after a liver transplantation. Lipopolysachryde (LPS), also known as endotoxin is a key component of gram-negative bacteria and increase during portal occlusion during a liver transplant. LPS binds to receptors located on the hepatocyte membrane and through signal cascades trigger the release of cytokines, which are detrimental to hepatocytes, especially steatotic ones. In our study we set out to test the hypothesis that steatotic hepatocytes expresses more toll-like receptor 4 (TLR-4) making them more sensitive to LPS insult than their lean counterparts. **Method:** ob/ob and lean mice hepatocytes were isolated using a two- step perfusion method; the cells were placed on collagen plates and labeled for Flow Cytometry, using a TLR-4 mAb. Through the use of Flow Cytometry, we are able to identify hepatocytes whose membranes contain TLR-4 and also identify cells that have gone through apoptosis.

Sheree Star Sidney<sup>1</sup>, Dr. Bert Ely<sup>2</sup>  
<sup>1</sup>University of South Carolina, Senior

**The African-American DNA Roots Project: Y Chromosome variation in the Mende and Limba ethnic groups**

The goal of the African-American DNA Roots Project is to link African-Americans to present day representatives of their ancestors. Though various types of DNAs may be found throughout Africa, our hypothesis is that DNAs distinct to a single ethnic group or a set of related ethnic groups may be found. We tested this hypothesis by taking samples from males of four different ethnic groups found in Sierra Leone; the Mende, Limba, Temne, and Loko ethnic groups. We then examined the mitochondrial DNA and demonstrated that the haplotype distribution was different in the Limba as compared to the other ethnic groups. To determine whether this variation was unique to the mtDNA, we analyzed the Y-chromosome DNA of the Mende and Limba sample. Using PCR to amplify segments of Y-chromosome DNA and restriction digests to identify mutations at the PN-1, M1, M60, M35 and M213 loci, we were able to assign each Y-chromosome to one major haplogroups. A comparison of the Mende and Limba haplogroup distributions will be presented.

Atyia Sapp<sup>1</sup>, Dr. Michael Armstrong & Dr. Albert Santos<sup>2</sup>  
<sup>1</sup>College of Charleston, Junior  
 MUSC, Charleston, SC

**Frequency of Cervical Stenosis and Residual Disease Following Loop Electrosurgical Excision Procedure Compared to Cryotherapy for Treatment of Squamous Intraepithelial Lesions**

The objective of the project is to determine and compare treatment outcomes for loop electrosurgical excision procedure (LEEP) versus cryotherapy. The two main outcomes that will be evaluated are cervical stenosis and residual disease. Patients will be assigned to two different cohorts based on their colposcopic directed biopsy findings. The two groups will be low-grade squamous intraepithelial lesion (LGSIL) and high-grade squamous intraepithelial lesion (HGSIL). We expect to find that cervical stenosis occurs more frequently in patients treated with LEEP and no difference in the occurrence of residual disease among patients treated with LEEP or cryotherapy. It is also expected that patients with HGSIL are more likely to acquire residual disease after treatment surgery, compared to patients with LGSIL.

We are conducting a retrospective cohort study (chart review) of 200 patients who received their care at the primary site of the Medical University of South Carolina (MUSC) in Charleston, SC. All patients were treated with LEEP or cryotherapy for squamous intraepithelial lesions. The results obtained so far will be presented and the methods used to obtain the data will be discussed. The last step of the project will be to perform a statistical analysis to determine if any statistically significant difference exists. Our initial sample size and power calculations speculate that for an expected 32% probability of an adverse outcome with LEEP and a relative risk ratio of 4 with a 95% confidence interval, 100 patients are needed to observe a significant difference.

James Richburg<sup>1</sup>, Dr. Kelli L. Hiatt<sup>2</sup>  
<sup>1</sup> South Carolina State University, Sophomore  
 USDA-ARS, Athens, GA

### Detection, using 16S rRNA PCR, of bacterial species in water and biofilms associated with Poultry Flocks

Handling and consumption of poultry and poultry related products are considered to be primary sources for *Campylobacter* induced gastroenteritis in humans. The high colonization prevalence of poultry and the resultant clinical infection in humans has prompted a number of investigations focused upon identifying and subsequently eliminating sources of *Campylobacter* contamination in chickens. One suspected source of contamination is exposure of poultry to contaminated water or biofilms associated with water delivery. In an effort to further understand the contribution of water and biofilms to the contamination of poultry flocks, PCR (Polymerase Chain Reaction) was used to detect bacterial species (including *Campylobacter*) on water filters feeding into poultry flocks. The PCR employed 16S rRNA universal primers to amplify an ~800 base pair product from all bacterial species present in the filter. The amplified products were subcloned and subjected to DNA sequence analysis using M13F and M13R primers. The sequence data was assembled using Sequencher 4.1 and compared to known bacterial species using the BLAST (Basic Local Alignment Search Tool) server.

Ebony Hilton<sup>1</sup>, Michael Kern, Ph.D.<sup>2</sup>  
<sup>1</sup> College of Charleston  
 College of Charleston, Charleston, SC

### Immunolocalization of Prx1 protein during large vessel development.

Hypothesis: We seek to prove that Prx1 protein is present in developing large vessels.

Aim: The purpose of this project is to determine if Prx1 protein is expressed and the specific location in which Prx1 protein is produced during the embryonic developmental stages of the vascular system. Previous studies have shown that deletion of this gene leads to a substantial malformation of the vascular architecture, especially pertaining to the aortic arch and the ductus arteriosus. We seek to determine the importance of this protein during development by conducting a series of experiments in which the vascular system is observed in both Prx knockout mice and wild type mice. This work will be performed using Prx1 specific antibody staining.

# Engineering and Engineering Technology

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Anthony Gibbs<sup>1</sup>, Dr. Jim Payne<sup>2</sup>  
<sup>1</sup> Midlands Technical College  
South Carolina State University

## Intro to basic *Labview*

Of the many different ways to measure, analyze and log data; the use of the software *Labview* seem to have revolutionized data acquisition and report generation. Various types of data can be acquired for different uses; i.e. averages for temperature readings, conversion charts, and amplitude readings; This data will be fed to the VI (Virtual Instrument), which will give the desired results. After working with *Labview* one must conclude the actual construction of the VI (Virtual Instrument) is the most challenging and the most fun. The use of digital switches, knobs, slides, and other hands-on gadgets brings life to operation of the front panel. As a summer research student I will present the fundamentals of *Labview*, with gathered data, then construct a VI (Virtual Instrument), and input the data.

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Sherita Gee<sup>1</sup>, Dr. Csilla Farkas<sup>2</sup>  
<sup>1</sup> University of South Carolina

## Anonymous Electronic Payment System

As the number of people using electronic commerce (e-commerce) increases, electronic payment systems are becoming part of our daily life. Prevention of frauds and privacy preservation are major concerns of e-commerce users. While full anonymity has been studied recently, it does not provide the accountability needed for e-commerce applications. The focus of the proposed research is to investigate and improve on protocols that provide accountable anonymity for e-commerce applications. Electronic payment systems must offer some degree of anonymity so the ability to link a buyer with a purchase is reduced. Presently, there are systems that offer unconditional anonymity to no anonymity at all. Neither of these approaches is fully satisfying: no anonymity violates users' privacy; full anonymity lacks accountability and can be misused. Electronic payment systems must provide accountable anonymity to be accepted by users and e-commerce service providers.

In controlled electronic systems, tracing mechanisms are used to trace coins. This can only be possible in cooperation with a trusted third party. The third party has information that can be used to link coins and users. Tracing mechanisms such as "owner tracing" prevents illegal purchases and allows authorities to identify the involved users. Tracing and various payment schemes play a vital role in the implementation of anonymity control. Anonymous communication between different parties is necessary in to have anonymous cash. In my research I will analyze the anonymity concerns in electronic payment systems and it can implemented using anonymous communication protocols.

Joseph Bonivel<sup>1</sup>, Dr. David Rocheleau<sup>2</sup>  
<sup>1</sup> University of South Carolina

### **Camless Engine Research**

The Mechanical Engineering Department has invested its money in camless engine research because of its revolutionary benefits. Increased efficiency, reduced emissions, and improved power are just three of these concepts introduced by variable valve timing. Algorithms are made to control valve actuation using piezoelectric devices to replace solenoids in order to achieve these benefits. Given a three horsepower Briggs & Stratton lawnmower engine, the first steps to converting this engine into a new and improved engine involved running numerous tests to check the power and fuel efficiency of the engine. The first three weeks of research involve testing the number of grams of gasoline that the engine consumes at different speeds and field loads. This information will prove vital once the engine has been converted to camless. Tests with the new modified engine will be run in order to verify the benefits of a camless engine.

William Neely<sup>1</sup>  
<sup>1</sup> University of South Carolina

### **Battery and Fuel Cell Efficiency**

Briefly, the system will consist of a fuel cell and/or battery power source for a set of radio and sensor equipment. I am working with the fuel cell system to find the minimum size fuel cell that meets the load power requirements for a set of semi-random missions. Also, I am working with a battery power source and doing the same simulation experiment. After those tests have been completed the fuel cell will be combined with a battery, or the fuel cell with an ultracapacitor, or the battery with an ultracapacitor. Then simulations will be done for the new system to see what is the new minimum system configuration to meet the mission requirements. The minimum system includes the mass of the hydrogen storage system. This means that a small fuel cell that operates inefficiently may not be better than a large fuel cell that operates more efficiently. The radio and sensor equipment are the same equipment soldiers in the battlefield use and they need to be able to operate this equipment over a 24 hour period. The power requirement of the equipment varies over 24 hour period, for example the radio portion of the equipment may not be needed at 7 O'clock in the morning but may be used extensively during the middle of the day. So in the model of the system the load, which in electrical engineering is represented by a resistor, varies with time. The way this resistor varies with time was given in my part of the research. My main duty in the research is to find a configuration of the battery and the fuel cell that efficiently supplies power to the load of the required amount of time. Also I added ultracapacitor in with the battery and the fuel cell configuration in order to try to increase the power ratio system.

Harry L. Jenkins<sup>1</sup>, Dr. Stuart O. Nelson and Dr. Samir Trabelsi<sup>2</sup>  
<sup>1</sup> Claflin University  
 USDA-ARS Athens GA

### Programming a Multi-Parameter Microwave Sensor Prototype

Phase I – Gain an understanding of gathering data on the moisture content of grains and oilseeds by using a current technique (oven-drying), and a future nondestructive technique (microwave). Then used that knowledge to aid in modifying the current program that controls a vector network analyzer connected, through quality cables, to a free-space transmission system to create a user-friendly program. Once user-friendly, the program was again modified to solve the phase shift ambiguity with an educated guess of the complex permittivity.

Phase II – To begin working on writing a program for the microchip controller that will be used for a compact prototype that will provide simultaneously both density and moisture content of cereal grains and oilseeds from measurement of the relative complex permittivity. Several calibration algorithms are to be embedded in the microchip controller.

Monica Fripp<sup>1</sup>; Dr. John Foulk<sup>2</sup>  
<sup>1</sup> Benedict College; Freshman  
 USDA-ARS, Athens GA.

### Linear Density Analysis of International Flax Fibers to Improve Airflow Methods

Flax (*Linum usitatissimum L.*) provides food, fuel, and fiber worldwide. Flax fiber use is growing in the textile industry. Unfortunately, the U.S produces very limited amounts of flax for textiles, but the U.S is the largest per capita consumer. An increase interest in developing a flax fiber industry for use in textiles and other products has grown in the U.S. Research for improved retting methods coupled with this consumer demand are tests to judge fibers for manufacturing performance. Fiber flax could supply the textile industry with value-added natural fibers for blending. Production of high quality short staple “cottonized” flax allows the use of economical non-traditional production. Since fiber fineness influences handle, luster, fiber cohesion, yarn strength, and uniformity it affects quality and the manufacturing process. Research requires consistent test methods for fiber quality fineness measurements. Developmental ASTM International Standard test methods were used to measure the fineness of loose flax fibers by estimating the mass per unit length of each fiber to determine linear density. Finding linear density alone is strenuous and prolonged for everyday commercial uses. Fiber fineness can be measured indirectly by the resistance of airflow through a known mass of fiber compressed to a fixed value. Through ASTM test methods, airflow can be easily related to linear density results. Such analysis will be used in the development of an ASTM International Standard to efficiently judge fiber quality for commercial trading.

Cindi Hyman<sup>1</sup> & Sharneca Robinson<sup>1</sup>, Dr. Edward P. Gatzke<sup>2</sup>  
<sup>1</sup> University of South Carolina

### **Dynamic Modeling and Simulation of Methanol Reformers**

The consumption of natural resources and air pollution have had a dramatic effect on the environment. Alternative energy carriers have peaked the interest of countries worldwide. A great deal of that research is focused on fuel cell. Fuel cells are electricity producers that convert energy from natural gas. One of the most common fuels for fuel is hydrogen. However, there are some drawbacks associated with the hydrogen. Pure hydrogen is very difficult to store, thus making the refueling process problematic. There is a simple solution to the refueling process – instead of using hydrogen, use methanol as the fuel. Methanol is more convenient to store and because of its high hydrogen content, it is easy to reform into hydrogen. But with using methanol as the fuel, a reformer has to be implemented into the process. The task of the reformer is to extract the hydrogen from the methanol so that it can be fed into the fuel cell.

The objective of this research is to create and simulate a dynamic model of a methanol reformer. To meet this objective, several literature reviews have been done to gain adequate understanding of fuel cells systems, and to find kinetic data of the reforming reactions. The reactions rate constants and reaction rate expressions were obtained from literature and substituted into the general balance equation. The reformer can then be analyzed using the simulated results for optimization.



# Mathematics & Computer Science

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LaTonya Peebles<sup>1</sup>, Dr. Barnes<sup>2</sup>,  
<sup>1</sup> South Carolina State University, Junior  
USDA-ARS, Athens GA

**Creating and Designing a database that is capable of querying and data-mining isolates that will meet a specific set of characteristics.**

*Clostridium perfringens* is a major cause of foodborne bacterial disease in the U.S. and worldwide. The major sources of this organism are meat and poultry products. In order to research means to reduce this bacterial pathogen in poultry, an ARS lab has archived a large collection of these bacteria from a variety of times, places, sources, and geographies. Amounting to a total of over 3,000 labeled tubes containing the stored bacteria the means to access, sort, select and search for specific bacterial strains matching a set of characteristics is required. Otherwise, manual searching and selection would greatly limit the subsequent research-value of this archived collection.

After completing data transfer from Excel and handwritten notes, relational database was created and adapted to the data spreadsheet containing the original strain-associated data. Using a capable of querying and data mining for specific bacterial isolates that meet a specific set of characteristics. Without this tool, the archived collection of organisms would be virtually untapped for use in genetic research due the inability to manually select isolates using set-specific criteria.

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Tufuantsi Daniel<sup>1</sup>, Robert E. Jamison (PhD)<sup>2</sup>  
<sup>1</sup> Claflin University, Sophomore  
Clemson University, Clemson SC

**An investigation of Poset Rankings of Graphs – The case of semi-ranking by the V partial order**

The notion of ranking was introduced in 1988 by Iyer Ratliff, and Vijayan who were motivated by separator trees and the VSLI layout.

A *ranking* on a graph is an assignment of positive integers to its vertices such that any path between two vertices of the same rank contains a vertex of strictly larger rank. In a *co-ranking* the condition is reversed: there must be a vertex of strictly smaller rank. In a *bi-ranking* both of the conditions must be satisfied. However, in a *semi-ranking*, two vertices of the same rank must be separated by either a vertex of strictly larger OR smaller rank on a graph. Rankings, co-rankings, and bi-rankings, therefore, belong to the wider class of semi-rankings, and all four labelings are proper colorings of a graph.

The idea of ranking has only to do with the relative order of individual ranks so the notion can hold if the ranks are taken from a partially ordered set. We shall look into the smallest interesting case.

The V poset is a height 2 partial order that consists of three elements: one is a minimum element and the other two are larger but incomparable elements. The class of all V – semi-rankable graphs is contained in the class of all 3-colorable graphs since V is made up of only 3 elements. It also contains all bipartite graphs (2-colorable) since V contains at least one chain of two comparable elements. *Minimal forbidden* graphs refer to the class of the smallest graphs that are V – semi-rankable only after the removal of any one edge. The study of the class of minimal forbidden graphs also gives rise to the study of four cycles and their interaction on graphs such as cycle permutation graphs.

Ricky Carreker<sup>1</sup>, Nelson Cox, Mrs. Debbie Posey, and Mr. Jason Richardson<sup>2</sup>  
<sup>1</sup> South Carolina State University, Sophomore  
 USDA-ARS Athens GA

### **Data and Image Manipulation to Enhance the Development of State of the Art Scientific Presentations**

In the field of poultry microbiological science the implementing of computer system programs becomes necessary for many different reasons. There are different procedures that must be followed by scientist and technicians in order to understand the published literature, to collect data, and develop publications. This project was designed to provide skills needed to track published literature, to input publications into a computerized bibliographic database, and to learn and use a software system which converts still digital images and video tapes into digital videos to be used in power point presentations. Reference Manager, which is a commercial bibliographic database, allows one to go online and download publications into readily accessible databases which can be easily used to make bibliographies for scientific publications and presentations. A poultry microbiological database consisting of 650 references was compiled for use in bibliographies. In addition, Adobe Premiere 6.5 was used to input and edit digital images and video tape into a usable digital video which could be incorporated into a power point presentation. Specifically, I took the still video images and worked side by side with a computer specialist to edit and create the digital video.

These projects were preformed to establish a far greater appreciation for what computer software programs can do when properly understood and applied.

Samuel De Ycaza<sup>1</sup>, Dr. Caroline Eastman<sup>2</sup>  
<sup>1</sup> Claflin University, Freshman  
 University of South Carolina, Columbia SC

### **Nutrition Information Retrieval in the World Wide Web: Comparisons between General Search Engines and Niche Sites**

Along with the exponential growth of the World Wide Web came the need and interest for information retrieval systems. Thus, search engines were created for the purpose of information retrieval. General search engines provide information from the entire web. However, niche sites possess information from a specific domain in the web; therefore, the information in these sites is limited to a specific topic. Previous research compared the relevance of the nutrition information obtained from nutrition sites (niche sites) in comparison to the results gathered from general web search engines; the general search engines retrieved results matching more queries than the niche search engines. Our research extends this previous research by evaluating more general search engines, and by submitting the queries to the Tufts Navigator site. This study utilized 71 nutrition queries from an Excite transaction log, which were submitted to MSN search, Teoma and Excite, as well as nutrition sites from the general nutrition category of the Tufts University Nutrition Navigator. The search results were evaluated for relevance. A match was relevant if it possessed a high score in our scale. Several details were taken into consideration, such as words in a query, the use of Boolean operators and inconsistencies in a query.

Latresa A. McCallum<sup>1</sup>, Dr. Caroline M. Eastman<sup>2</sup>  
<sup>1</sup> University of South Carolina, Senior  
 University of South Carolina, Columbia SC

### **Women in Science and Engineering: Are Principals the Key?**

Over the past few decades, there have been many studies and pilot programs addressing the recruitment of women into science and engineering, where they have been traditionally underrepresented, especially in engineering. This work has resulted in substantial information about what is and is not effective in dealing with issues such as self-esteem, awareness of options, and persistence. However, this information and its effective utilization remain in isolated islands. We view the support and participation of school principals, who set the directions for their schools, as critical for more widespread adoption of effective methods at early stages of the engineering and science pipeline. The work proposed here will use a survey to assess the familiarity of school principals in South Carolina with the issues involved in the recruitment and retention of women in engineering and science with the ultimate goal of improving the availability of effective programs. A workshop for principals will be developed based on the survey results. My research on this project involved developing a list of professional organization's dealing with women in sciences and engineering. After the list was completed, I went to each organization's website to find out which ones have programs that encourage middle and high school girls to pursue careers in the sciences and engineering. This information will be used to develop both the survey and the workshop.

Bryan Knight<sup>1</sup>, Alan Moore<sup>2</sup>  
<sup>1</sup> Claflin University, Sophomore  
 USDA-ARS Athens GA

### **ARS 20<sup>th</sup> Century Paper to 21<sup>st</sup> Century Electronic Age**

My internship is based around updating some resources that are available to the Property and Procurement, and Budget and Fiscal Division. I updated some clauses, created databases and converted documents from Word Perfect to Word to PDF Formats and created a new spreadsheet database for the Property and Procurement Division. I updated spreadsheets and posted them on the intranet for the Budget and Fiscal Division. I came during a period of transformation for the division. I helped out with the transformation of having important documents be available in Word format. I basically went to various government resources to update then converted them into Word and PDF documents to be downloaded from the internet. The PDF documents were also created to be editable at my mentor's request. I created a spreadsheet that would calculate the amount money to be paid to a contractor for a specific period of time. I also prepared a database for recording information about different vendors who want to do business with the South Atlantic Area. Specifically, this database will be used by procurement personnel throughout the Area for selecting preferred vendors (based on ownership, expertise, and location) for receiving solicitations for various construction and service contracts. I updated a spreadsheet that was the combined amount of money that was that was allocated to a specific location. I have also put some of these spreadsheets on the intranet for the locations with South Atlantic Area of the Agricultural Research Service to view and confirm the totals.

Tiffany Willis<sup>1</sup>, Dr. Joseph S. Bailey, Mr. Douglas Cosby, Mrs. Lalla Tanner<sup>2</sup>  
<sup>1</sup> South Carolina State University, Sophomore  
USDA-ARS, Athens GA

### **Use of a bibliographic database in Agricultural Research**

Agricultural research is trial and error. Research teams propose research ideas and implement them in the form of experiments. However, before a research team can begin an experiment, they must search for past or similar projects that have already been done. Knowing this vital information serves as the framework for the work planned and prevents unnecessary duplication. This is when Reference Manager becomes an essential tool. The only drawback is few individuals know how to use Reference Manager efficiently. My objective is to define the Reference Manager, review some of its major assets, and to implement a tutorial enabling more individuals to use Reference Manager effectively. Reference Manager is used to search, retrieve scientific articles, and copy articles from one database to another. A simple experiment can be tedious, cumbersome, and costly if a research team has no groundwork or past experiments to base their research upon. Therefore, it is necessary to document experiments. This makes Reference Manger a very useful tool.

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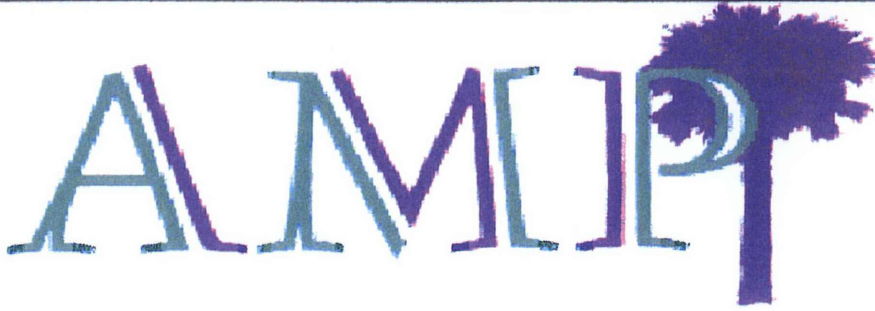
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LS-SCAMP State Office Email Address: [lsscampstoff@scsu.edu](mailto:lsscampstoff@scsu.edu)

**Allen University**

*Dr. Tom Crosby*

(803) 376-5756

[tcrosby@allenuniversity.edu](mailto:tcrosby@allenuniversity.edu)

**Midlands Technical College**

*Mr. Rick Bailey*

(803) 738-7618

[baileyr@midlandstech.com](mailto:baileyr@midlandstech.com)

**Benedict College**

*Ms. Vivian Counts*

(803) 253-5280

[countsv@benedict.edu](mailto:countsv@benedict.edu)

**Morris College**

*Dr. Radman Ali*

(803) 934-3266

[rali@morris.edu](mailto:rali@morris.edu)

**Clayton University**

*Dr. Shigara Sandhu*

(803) 535-5244

[ssandhu@clayton.edu](mailto:ssandhu@clayton.edu)

**Orangeburg-Calhoun Technical College**

*Mr. Walt Tobin*

(803) 535-1203

[tobin@octech.edu](mailto:tobin@octech.edu)

**Clemson University**

*Dr. Robert Snelsire*

(864) 656-5915

[ntbsnls@clemson.edu](mailto:ntbsnls@clemson.edu)

**South Carolina State University**

*Dr. Judith D. Salley/Mr. Nathaniel Gant*

(803) 536-8513

[jdsalley@scsu.edu](mailto:jdsalley@scsu.edu); [ngant@scsu.edu](mailto:ngant@scsu.edu)

**College of Charleston**

*Dr. Dinesh Sarvarte*

(843) 953-5736

[sarvated@cofc.edu](mailto:sarvated@cofc.edu)

**University of South Carolina**

*Dr. Michael Perkins*

(803) 777-4177

[perkins@engr.sc.edu](mailto:perkins@engr.sc.edu)

**Denmark Technical College**

*Dr. Ambrish Lavania*

(803) 793-5208

[lavaniaa@den.tech.sc.us](mailto:lavaniaa@den.tech.sc.us)

**Voorhees College**

*Dr. Cassandra Smith*

(803) 793-3351

[csmith@voorhees.edu](mailto:csmith@voorhees.edu)