Executive Summary for the Biology Department: Bachelor of Arts (BA), BA Secondary Education Track and Bachelor of Science Major in Biology

Major findings of the Program's Quality and Productivity

The detailed self-study of the Biology programs provided an opportunity to assess those areas within our different degree tracks where we are having success and those areas that need adjustment. The areas that were assessed by the Department faculty members as above average to very strong are listed as our strengths, while those areas assessed by the faculty members to be weak or below average are listed as our weaknesses.

Program's Strengths in the Area of Quality

Appropriateness of Faculty Credentials
Use of Part-Time Faculty
Indicators of Good Teaching
Indicators of Good Advising
Opportunity for Student Research Projects
Service Activities to Enhance Program, Department, College, Institution, Community and/or Region.
Quality of Faculty and Student Achievements (faculty and student honors)
Relationship between Program's Curriculum and Its Outcomes
Incorporation of Technology
Utilization of Multidisciplinary Approaches
Utilization of Multicultural Perspectives

Program's Strengths in the Area of Productivity

Enrollment in Program for Past 5 Years
Degrees Awarded Over Past 5 Years
Cost Effectiveness of Instructional Delivery

Program's Weaknesses in the Area of Quality

Opportunities for Faculty Development
Availability of Classroom and Laboratory Space
Availability of Equipment

Program's Weaknesses in the Area of Productivity

Retention Rates
Graduation Rate of Program

List of Recommendations for Improving Program Quality

Faculty Development

- Faculty development opportunities would be improved by reducing teaching loads of those faculty members actively engaged in research, grant writing, mentoring undergraduate and graduate student research projects
- Garner additional funding to encourage faculty members and students to attend professional meetings
- Support Master of Science in Biology. This would increase professional activities in the Department by involving faculty, graduate students and undergraduate students in research

Classroom and Laboratory Space

- Additional laboratory space for research to promote professional activities
- Additional laboratory space for teaching if we plan to increase service classes (Principles of Biology and A&P classes)
- Additional large lecture sections classrooms (currently only one room)

Equipment

- Duplication of critical equipment so that when equipment fails we are not forced to cancel labs and classes
- New equipment required for faculty research

List of Recommendations for Improving Program Productivity

Retention Rates

- Retention rate comparison between programs on campus gives us one measure of retention; however, it would be beneficial to compare our retention rate to other Biology programs in Georgia.
    - We feel that our retention rate could be improved. We have over 400 majors (167 are currently freshman); however, we only graduate on average 30 students. Where do they go? Do they change major? Do they leave CSU?
- Promoting the competitive pre-medical program will attract well prepared students and improve our retention rate

Graduation Rate

- All Biology majors must take Cell Biology and Genetics and earn a "C" or better before they move on to Ecology and Biosystematics. We were only offering each class once a year (Cell and Genetics in the fall and Ecology and Biosystematics in the spring), creating a progression issue for many students. Currently we offer all four classes each semester (Cell, Genetics, Ecology and Biosystematics). This should improve progression and graduation.
- All students in the BS track are required to complete a research project. To improve progression and graduation we have created a research-based internship option that will promote new research opportunities for our seniors.

Conclusion about the Program's Viability at CSU

The Biology Program at CSU is viable now and will continue to be viable in the future. We will continue to educate the students that will become doctors, dentists, pharmacists, veterinarians, teachers, ecologists and broadly trained biologists who will monitor our living world. We will continue to educate our students to conduct professional research, think critically and write concisely.

Program Improvement Plan (completed by Dean and VPAA with Department Chair)

Summary Recommendation and Supporting Rationale

Enhance or Expand the Program

1. Competitive Pre-Medical Program
2. Experiential Research-Based Internships
3. Master of Science in Biology
4. Innovative International ecology/evolution or health-related courses

We have talented and dedicated faculty members that are widely trained in the diverse areas of biology. Our faculty members are focused on the success of our students and our program rather than self-promotion. We will continue to lead by example in the areas of professional research, presentations, publications and grant writing. Our courses will always require intense laboratory or field work resulting in individual and group projects that solidify the importance of research for our students. We hold our students to high standards and inspire them to take responsibility for their actions. Our program is successful due to the dedicated work of those faculty members that came before us, and we will continue to be successful as we grow and improve our programs and degrees.

2012 Department of Biology: Detailed Self-Study

Section One – Program Background and Overview

I. Brief Program Overview

Description of Program

The faculty members in the Department of Biology believe in the importance of a hands-on experiential program. Our courses are highlighted by extensive lab and field-based experiments. The philosophy of learning by doing has and will continue to be our guiding principle in the Department of Biology. Our graduates are broadly trained and prepared to serve society in a variety of employment opportunities and ready for the challenges of graduate or professional schools in biology and health-related fields.

The Bachelor of Arts in Biology is a flexible program that allows students to create a rigorous biology degree that fits their personal interests. Students build a program that best fits their goals and future plans by combining the core courses in biology with a minor in another academic discipline or a pre-approved minor equivalent.

Students may select a BA in Biology with Secondary Education. This program provides students with the experience and course work required for a degree in biology along with the expertise and pedagogical background to teach biology in middle or high school.

The Bachelor of Science in Biology, a more structured and prescribed degree, is most appropriate for those students planning to pursue post-graduate studies. The curriculum requires that the student develop and complete an independent research or research-based internship project which consists of a proposal, data collection, analyses and presentation of the final product.

In addition to those students in the BS program who conduct independent research or internship projects, students in the BA and BA Secondary Education program completed research projects as well. Students are encouraged to work with faculty mentors to develop and successfully complete their research or select outside organizations to conduct research-based experiential learning internships that will enhance their education. The bottom line is that the final degree - no matter if a BA, BA Secondary Education or BS - should reflect the experience desired by the student. Students are encouraged to exercise control over the development of their degree program within the limits of their major.

The program is staffed by 14 full-time faculty members and by four part-time instructors who are employed “as needed”. In the last year (fall 2011 and spring 2012) the program generated 9777 student credit hours, an increase of 29% since 2007/2008. This increase is due to the large lecture size (120-168 students) in the 1000- and 2000-level classes and the availability of graduate student teaching assistants to teach the labs. As of fall 2011 we had 434 majors in Biology.

Program Mission and Its Relation to CSU Mission

Biology graduates will be able to:

- Demonstrate knowledge and understanding of key concepts, principles, theories, and methods in four core areas: cell biology; molecular biology and genetics; organismal biology; and population biology, evolution, and ecology.
- Employ critical and analytical thinking in application of the scientific method, including formulating and testing hypotheses, designing experiments, analyzing data, interpreting results, and drawing conclusions.
- Report orally and in writing research results and conclusions according to accepted standards of professional biologists.
- Demonstrate knowledge of standards of professional and ethical conduct in biology.
- Demonstrate knowledge of careers in biology.

The Biology major reflects the mission of the university in its goals to achieve academic excellence through research, inquiry and engagement, to prepare our graduates for success, and to encourage leadership and service.

Stakeholder's Satisfaction with the Program

The major stakeholders are our current students and graduates and those that employ our graduates. The Department of Biology conducted a survey of our current seniors and graduates who have graduated in the last five years. (Appendix 1. CSU Biology Current Students and Alumni Survey 2012)

The following questions relate to the satisfaction of our graduates (N=37). Each is scored on a scale of 1-5 (very poor or strongly disagree – very good or strongly agree).

- What would you do if you had it to do over?
  - 60% would still choose biology
  - 11.4% would major in biology but somewhere other than CSU
  - 28.6% would select another major
- Please rate your agreement with the following: My degree in biology has had a significant positive effect in my life. Score 4.6/5.0

The same questions were asked of current senior biology majors (N=20)

- What would you do if you had it to do over?
  - 65% would still choose biology
  - 25% would major in biology but somewhere other than CSU
  - 10% would select another major
- Please rate your agreement with the following: My degree in biology has had a significant positive effect in my life. Score 4.55/5.0

Relationship of Program Needs to Student and Societal Demands

In the previous CPR document for the Department of Biology, the majority of our majors selected a career path in education. However, the most recent analysis shows a shift to the health-related fields with nearly half of our responding graduates in medical, pharmacy, or dental school or in community health and medical technician positions. According to the US Bureau of Labor Statistics Occupational Outlook Handbook 2010-2020 (updated March 2012), these are the areas of predicted greatest growth in the job market. Additionally a shortage in the area of veterinary medicine is predicted. Other areas of growth (environmental, ecological and wildlife biology) may occur; however, they are dependent on the intrinsic value determined by an often very short-sighted society.

The following questions relate to the satisfaction of our graduates. Each is scored on a scale of 1-5 (very poor or strongly disagree – very good or strongly agree).

- Please rate the relevance of biology courses at CSU to your career goals. Score 4.16/5.0
- Please rate the quality of preparation towards career and/or graduate studies. Score 4.05/5.0

To provide our students an opportunity for on-the-job experiential learning, the Biology Department has recently approved a research-based internship option for our seniors. Therefore, our students can select between an independent senior research project conducted with CSU faculty or a research-based internship where they can make professional contacts and gain experience with techniques and/or equipment not available in our department.

Lastly, the Department is in the beginning stages of a Master of Science proposal. This new option would fill a growing educational gap in the area of organismal biology. As many institutions have moved away from field-based applied research to molecular-based research, there has been a growing need for biologists trained with the knowledge and expertise to work in the field and conduct basic identification and ecology-based research. Our proposal is to leverage the wide range of organismal expertise in our department and the biological diversity of the Southeast to develop an MS in Biology dedicated to training the next generation of basic field researchers. We will utilize the power of molecular and cellular techniques as a tool to delineate and define the diversity of the Southeast and conduct ecology-based projects combined with the skill set of traditional taxonomy. According to the US Bureau of Labor and Statistics Handbook, this is another area of potential job growth with the advent of global warming, environmental stress and the listing of new species and habitats as threatened.

Section Two – Indicators of Program Quality

II A. Quality of Faculty

Appropriateness of Faculty Credentials

Assessment of Indicator: Very Strong

Thirteen of the 14 full-time faculty members have terminal degrees and one has an M.S. degree.

Dr. Julie Ballenger - Professor; Dept. Chair - Ph.D. Miami University 1992 - Plant Taxonomy, Plant Molecular Phylogenetics. Current Research: wetland plant communities in the Georgia fall line sand hills.

Dr. John Barone - Associate Professor, Departmental Director of International Education - Ph.D. University of Utah 1996 - Ecology, Biodiversity, Conservation. Current Research: Community ecology and distribution of southeastern prairies; ecology of tree holes; structure of ant communities.

Dr. Kevin Burgess - Associate Professor - Ph.D. University of Guelph, Canada 2004 - Plant Ecological Genetics, Botany, Conservation Genetics. Current Research: Discriminating plant species and population genetics using DNA barcoding.

Dr. John Davis - Associate Professor - Ph.D. Indiana University Bloomington 1994 - Microbial Biochemistry, Physiology and Genetics of Environmental Microbes. Current Research: Pink pigmented facultative methylotrophs; bacteria in pitcher plants; point source of *E. coli* in regional waterways.

Dr. Monica Frazier - Associate Professor - Ph.D. University of Alabama at Birmingham 2001 - Use of novel dietary compounds for the treatment of prostate cancer with an emphasis in bone metastasis. Current Research: Drug discovery research involving the use of dietary compounds as chemopreventive or chemotherapeutic agents against prostate cancer.

Dr. Harlan Hendricks - Professor - Ph.D. Virginia Polytechnic Institute and State University 1993 - Arthropod Ecology and Evolution, Insect Systematics. Current Research: Comparative toxicity of widow spiders in the Chattahoochee Valley.

Dr. Katey Hughes - Associate Professor - Ph.D. University of Florida 2004 - Functional Genomics, Neuroscience, Physiology. Current Research: Role of conjugated estrogens in astrocyte survival under oxidative stress.

Ms. Ely Klar - Lecturer; Laboratory Manager - M.S. University of Georgia 1986 - Anatomy and Physiology, Histology. Current Research: Histological assessment of physiological and anatomical change due to environmental impacts.

Dr. Milwood Motley - Associate Professor - Ph.D. University of Louisville 1983 - Medical Microbiology. Current Research: Virulence factors of pathogenic fungi; antiviral activity of proteins involved in innate immunity.

Dr. Jennifer Newbrey – Assistant Professor – Ph.D. North Dakota State University 2007 - Avian Ecology. Current Research: Avian reproduction and physiology with an emphasis on wetland ecosystems.

Dr. Clifton Ruehl – Assistant Professor – Ph.D. Florida International University 2010 - Aquatic Ecology of Invertebrates. Current Research: Interface of evolutionary biology, population and community ecology of invertebrates.

Dr. Brian Schwartz - Professor; Assistant Department Chair - Ph.D. University of Wisconsin-Madison 1992 - Genetics. Current Research: Copper utilization mutants in yeast; sex determination and copper utilization in the fern *Ceratoptoris richardii.*

Dr. Glenn Stokes, Professor - Ph.D. Pennsylvania State University 1981 - Vertebrate Physiological Ecology, Herpetology. Current Research: Movement behavior patterns of turtles; cytotoxicity of orthodontic materials.

Mr. Carson Stringfellow - Assistant Professor, Safety Officer *M.S. Columbus State University 1997 - Freshwater Mussel Taxonomy & Ecology. Current Research: Freshwater mussel and native crayfish interactions; continued refinement of freshwater mussel classification. (Deceased January 2012)*

Dr. Jeffrey Zuiderveen - Professor - Ph.D. University of Kentucky 1994 - Aquatic Biology, Ecology and Toxicology. Current research: Feminization of male bass by pollutants; gerontogene effects on toxic responses.

Use of Part-Time Faculty

Assessment of Indicator: Very Strong

Three of the four part-time faculty members have terminal degrees and one has an M.S. and is pursuing her Ph.D. in Education Leadership. Currently, the Department has very talented part-time faculty members. However, we do not want to rely on part-time faculty to teach required courses for our majors. Instead they should be allowed to enhance the program by offering unique upper level electives or covering area D core classes when needed.

Dr. Bill Birkhead - Professor Emeritus - Ph.D. University of Texas 1968 - Vertebrate Biology (esp. natural history). Current Research: Long-term study of gopher tortoise burrows; fish host(s) of the purple bank climber; fish of Fort Benning; vertebrates of Callaway Preserve.

Dr. George Stanton - Professor Emeritus - Ph.D. University of Maine 1969 - Aquatic Ecology; Conservation and Ecology of Crayfish; Aquatic Entomology. Current Research: Crayfish ecology; aquatic bioassessment; ecology of decomposition communities.

Dr. Dorothy Cheryuiot – Ph.D. Auburn University 2012 – Effects of heavy metals and hyper accumulation in the food web; plant and insect ecology.

Ms. Lashaunda Norman – Ph.D. Kansas State University (pending 2013) – Curriculum and Instruction; General Science and Biology Education.

Diversity of Faculty

Assessment of Indicator: Satisfactory

For each year, four of the full-time faculty members have or had a reduced teaching load due to administrative duties (Chair, Assistant Chair, International Education Coordinator and LeNoir Hall Safety Officer). In 2010 one faculty member was on sabbatical during the spring semester.

In addition to gender and ethnic diversity, the faculty members of the Department of Biology represent the various areas of specialty in biology. Faculty members are trained in cellular and molecular biology, organismic biology and ecology and evolution, as well as sub disciplines within these areas. We have selected new faculty members based on needs of the Department and areas of new direction based on the job market and current research trends. Lastly, our faculty members have earned their degrees from across the United States as well as Canada, which enhances cultural diversity in our program.

	Full-time Faculty					
	2007	2008	2009	2010	2011	2012
Male	9	10	10	10	10	9
Female	4	4	3	4	4	5
Black	2	2	2	2	2	2
White	11	12	10	11	11	11
Hispanic	0	0	1	1	1	1
Total	**13**	**14**	**13**	**14**	**14**	**14**

Part-time faculty teach one class per semester (three credit-hour, lecture only or four credit-hour, lecture plus lab)

	Part-time Faculty					
	2007	2008	2009	2010	2011	2012
Male	1	0	1	2	2	2
Female	2	2	0	2	2	2
Black	0	0	0	2	2	2
White	2	1	1	2	2	2
Hispanic	1	1	0	0	0	0
Total	**3**	**2**	**1**	**4**	**4**	**4**

Opportunities for Faculty Development

Assessment of Indicator: Below Average to Satisfactory

Over the past five years faculty members have received over $130,000 in support for faculty development. This funding was received from the Provost/VPAA Faculty Development budget, the College of Letters and Sciences, the Center for International Education and the Department of Biology to support research (purchase of materials and equipment), travel to professional meetings, and international travel for site visits, as well as teaching international courses. In addition, faculty members have received over $220,582 from a variety of outside agencies (such as GA DNR, US Fish and Wildlife) have collaborated on over $20,000 in research funded grants and have over $1,000,000 in pending grant applications. (Appendix 2. Publications, Presentations and Grant Applications)

- faculty have published over 36 professional papers
- faculty have presented over 64 professional talks
- faculty have served as reviewers for professional journals and textbooks
- faculty are officers in professional organizations

Faculty members can apply for semester- or year-long sabbaticals. In spring 2010 John Barone was awarded a one-semester sabbatical. This allowed him to spend a semester conducting prairie research with colleagues from Mississippi State. This collaborative research is ongoing. In addition, he used the time to develop a new upper level (5535) course for biology majors.

Lastly, an initiative from the COLS is to strive for workload equity among faculty members. The goal is to reduce course load or contact hours for faculty involved in active research programs. Those faculty members mentoring undergraduate and graduate research or applying for and obtaining external funding will also be rewarded with a course load reduction.

Program Improvement Plans

1. Enhance financial support to attend professional meetings and workshops Due to budget cuts, faculty take creative advantage of every opportunity availed, but with fewer funds to be distributed, faculty are forced to make difficult choices between attending meetings where our students present or attending professional meetings where we can present research or learn about new research opportunities.
2. The Department of Biology has proposed a Master of Science in Biology degree which will enhance overall productivity and professionalism.
    a. We currently have 441 majors; while many continue their education in the area of health sciences (medicine, pharmacy, dentistry, etc.), a growing number of our graduates seek an advanced degree in biology.
    b. In order to support graduate students as teaching assistants, we will need to move Elizabeth Klar (Principles of Biology lab coordinator, Human Biology lecturer and lab instructor, A&P lab instructor, Histology lab instructor, lab safety coordinator) to a state-funded position.
3. Hire a lecturer to maintain student credit hours generated and allow course load reduction for most full-time faculty members. The alternative would be to reduce core and service courses.
4. We need to increase the number of full-time faculty and increase the diversity in our areas of expertise to keep pace with the increasing number of Biology majors.
5. Over the past five years the number of full-time faculty has remained constant while the number of credit hours generated has dramatically increased. From fall 2007 to fall 2011, student credit hours generated increased by 27.3% (3573 SCH to 4912 SCH) while the total number of faculty increased by 11%. By increasing lecture size and utilizing graduate students in Principles of Biology laboratories, we have been able to cover these increases and offer those faculty members teaching large lecture sections a one-course reduction in load. We need to permanently reduce teaching loads for those involved in research and grant writing, as well as those mentoring undergraduate and graduate research. (Appendix 3. Current workload and courses taught)

II B. Quality of the Teaching

Indicators of Good Teaching
Assessment of Indicator: Above Average

The Social Research Center provided summary data of course evaluations. All Biology courses combined yielded an average score of 4.38 out of 5 (N = 1995) with the highest value scored for the question “is the instructor well prepared?” = 4.65 and the lowest for “I have progressed in my ability to think critically, to solve problems and/or to make decisions” = 4.02. The 1000-level biology courses averaged the lowest scores with an average of 4.18 and the 4000- and 5000-level courses averaged the highest at 4.58. The highest average score was for a full-time faculty

member at 4.85, and the lowest was for a part-time faculty member at 3.32. (Appendix 4. Biology Review Data from the Social Research Center)

All senior Biology majors were surveyed in their capstone biology class to determine their assessment of teaching quality in our program. They rated the quality of instruction at 4.2 on a scale from 1-5. However the availability of courses was rated at 2.9. This low number should improve due to all four junior courses – Cell, Genetics, Ecology and Biosystematics – being offered each semester. The variety of courses was rated at 3.35, and the times courses were offered was rated at 3.25. In correlation with the shift in students applying for medical, dental, pharmacy and other health-related fields, one of the main requests for program change was that we offer more medically-related courses. In addition, several students recognize the need for more variation in the 5000-level electives and that more be offered each semester. Both of these initiatives would require additional faculty members.

The numbers reported support the assessment of above average and that there is room for improvement for both full-time and part-time faculty members.

The biology faculty have utilized a variety of unique teaching methods including the ecology-based international courses (Andros - Bahamas, Australia, Belize, Botswana, Costa Rica, Ecuador), the use of peer leaders in lecture and labs, and international service-based courses focused on health issues (Andros – Bahamas).

Indicators of Good Advising
Assessment of Indicator: Very Strong

To address the demands of a large number of undergraduates, the faculty members in the Department of Biology have elected to offer advising for the two weeks prior to registration instead of the campus norm of one week. Each advisor is assigned 40-50 advisees. In addition to general advising of BS and BA students, Biology faculty members provide specialized advising for pre-medical, pre-dental, pre-pharmacy and pre-veterinary Biology majors, as well as BA Biology Secondary Education students.

Biology alumni and senior Biology majors were surveyed and rated the quality of academic advising in Biology with scores of 4.19 and 4.10 out of 5, respectively.

Departmental Reward System
Assessment of Indicator: Satisfactory (Average)

Each faculty member is assessed on an annual basis by the Department Chair in regards to advising and teaching. Based on these evaluations, recommendations for merit raises and for promotion and tenure serve as a measure of progress each year. In addition, if there are student complaints, the Chair meets with the faculty member to address issues that can be modified or corrected if needed.

Program Improvement Plans

To reduce some of the stress for incoming freshman, the Biology Chair and Assistant Chair will pre-register students during summer orientations. This will also ensure that these students take the correct courses and get off to the best possible start in their first semester. In the future, incoming freshman Biology students will be advised in the Advising Center for Excellence until they enter their junior year. In addition to excellent academic advice, ACE can provide our freshman and sophomores with enhanced services, including “intrusive” advising and interventions based on MAPWorks student survey responses and classroom performance. This modification will also allow faculty members to spend more time with junior and senior advisees to ensure proper preparation for graduation and more meaningful career guidance. In order for Biology faculty to remain connected to freshmen and sophomores who are being advised in ACE, the Department will implement group advising of freshman and sophomores.

In order to improve pedagogy, teaching effectiveness will be assessed more systematically and rigorously using peer evaluations. (Appendix 5. Peer evaluation form)

II C. Quality of Research and Scholarship

Opportunity for Student Research Projects
Assessment of Indicator: Very Strong

All Biology majors pursuing a Bachelor of Science degree are required to conduct an independent senior research project. Students are advised to select a project, a research advisor and a second reader in their junior year. Students select projects based on personal interest or interests of the faculty selected as a mentor. Students write a

proposal, conduct their research, analyze data and present their final report. Students are encouraged to apply for grants (BBB and SRACE) and to present their projects at a professional meeting. Many students present their findings at CSU Tower Day, and six students are usually selected to present at the district Tri-Beta meeting held in conjunction with the annual Association of Southeastern Biologists meeting. (Appendix 6. Student research projects)

In addition to independent senior research projects, several senior-level courses include individual and group research projects. These projects incorporate and synthesize expertise gained in several of the upper level courses. Several course-related projects have been presented and/or published. All ecology-based international courses require research projects or individual projects conducted on site. Upon return, students analyze and present the data collected while studying the ecology and environments of carefully selected, minimally impacted international sites. All Honors students and CIE scholarship recipients are required to present their international ecology-based projects at CSU Tower Day.

Faculty Publications, Presentations and Grants
Assessment of Indicator: Satisfactory to Above Average (improvement in this area will depend on receiving reduced teaching loads)

Publications and Reports

Over the past five years Biology faculty members have authored or co-authored 36 professional papers and reports. (Appendix 2. Publications, presentations and grants)

Presentations

Over the past five years Biology faculty members have given 64 professional presentations at regional, national and international meetings, and many have been invited as seminar speakers. (Appendix 2. Publications, presentations and grants)

Grants

Over the past five years Biology faculty members have been awarded $49,243 from CSU University Grants, Faculty Development Grants, and STEM (Appendix 2. Publications, presentations and grants). In addition, several faculty have been awarded funding from external granting agencies (listed below, totaling $220,582).

2010 John Barone**,** J.G. Hill, R. Brown, L. McGinnis. Restoration of Black Belt Prairie Remnants along the Natchez Trace Parkway. National Park Service $5000.

2010 Kevin S. Burgess Genetic Analysis of Red Mulberry at Royal Botanical Gardens, Hamilton, Ontario, Canada. Royal Botanical Gardens, Hamilton, Ontario, Canada: $10,500

2010 Alicia Garcia, Michelle Elmore, Julie Ballenger and Kevin Burgess. Demographic and genetic consequences of small population size in *Arabis georgiana* (Georgia Rockcress). Fish and Wildlife Service: $5,000

2010 Alicia Garcia, Michelle Elmore, Julie Ballenger and Kevin Burgess. Demographic and genetic consequences of small population size in *Arabis georgiana* (Georgia Rockcress). Georgia Native Plant Society: $1,000

2011 Robert Bringolf (UGA) and Cecil Jennings (USGS) Jeffrey Zuiderveen. Assessment of Endocrine Disruption in Fish and Estrogenic Potency of Waters in Georgia. Georgia Water Resources Institute $20,000

2009 Bill Birkhead. Survey the American Alligator on the Eufaula National Wildlife Refuge US Fish and Wildlife $3500

2009 Carson Stringfellow. Warm springs Mussel Survey. US Department of Interior, US Fish and Wildlife. $55,000

2009 Carson Stringfellow. ACF River Mussel Poster. US Department of Interior, US Fish and Wildlife $5526

2008 John Barone, J.G. Hill, R. Brown, L. McGinnis. Restoration of black belt prairie remnants along the Natchez Trace Parkway. National Park Service, U.S. Department of the Interior $27,000.

2008 John Barone and J.G. Hill Identification and delineation of prairie remnants along the Natchez Trace Parkway. National Park Service, U.S. Department of the Interior $1500.

2008 Carson Stringfellow. Ongoing aquatic research at Warm springs for mussels, crayfish, and other insects. US Department of Interior, US Fish and Wildlife $55,000

2008 Bill Birkhead. Survey the American Alligator on the Eufaula National Wildlife Refuge US Fish and Wildlife $6480

2008 Carson Stringfellow. On-going freshwater mussel work in Georgia, Florida, and Alabama. US Department of Interior, US Fish and Wildlife $20,526

2007 John Barone and J.G. Hill. Restoration of the native ant community to southeastern prairies. Prairie Biotic, Inc. $450.

2007 Stringfellow, R. Carson and Jeffrey Zuiderveen. Resurvey of a Section of the Chattahoochee River for Endangered Freshwater Mussels as Related to the Area Proposed for the Longleaf Energy Station Outfall. LS Power $4,100

Program Improvement Plans

- Biology majors will apply for CSU Foundation grants to support undergraduate research and travel (Flora Clark Scholarship for Cellular and Molecular Research and the George Stanton Scholarship for Research in Ecology and Evolutionary Biology).
- Biology majors can elect to complete a research-based internship instead of a senior research project. Internships will provide our students real world experience working with professionals with expertise and equipment not available in our Department. Internships are currently being established with:
    - The Nature Conservancy
    - Fort Benning Environmental Command
    - US Fish and Wildlife (Warm Springs, Fort Benning, Eufaula)
    - Department of Natural Resources
    - Columbus River Keeper
    - Columbus Water Works
    - Medical Center
    - Local dentists
    - Local veterinarians
    - Crime Scene Investigation Company, Atlanta
    - Centers for Disease Control
- Columbus State University was recently selected to partner with the Gulf Coast Ecosystem Studies Unit. We will leverage this partnership to garner grants to support faculty and student research and travel to professional meetings to present results.
- Continue and increase collaborative research with colleagues across the Southeast and beyond (University of Mississippi, Emory, University of Virginia, University of Guelph).
- Improve faculty shared lab space to increase productivity and professional growth.
- Reduce faculty member teaching loads for all faculty to 9 contact hours per semester.

II D. Quality of Service

Activities to Enhance Program, Department, College, Institution, Community and/or Region
Assessment of Indicator: Very Strong

COLS and Columbus State University	**Columbus Community and beyond**
Faculty Senate	Science Olympiad, Science Fair and Help the Hooch
AAUP	GA Department of Education Performance Standards
Quality Enhancement Program	Columbus Page One Award Judge
NCAA Division II Faculty Representative	Columbus Genealogical Society
International Education Committee	Discussion panel on evolution and creation
Sustainability Committee and Master Plan Committee	Vista Care Hospice and Emergency Room Volunteer
Admissions Committee	PTO in Georgia and Alabama
Scholastic Honors	Relay for life, March of Dimes and Habitat for Humanity
Publication Committee	Regional judge for BBB Brooks and Johnson Awards
Technology Utilization Committee	Harris County Rails to Trails Committee

Animal Use Committee	Trees Columbus
General Education, General Education Reform and Core Curriculum Committees	Gulf Coast Cooperative Ecosystem Studies Unit
College Curriculum Committee	Partnership with state and national agencies located on Fort Benning and Fort Benning Environmental Command
PKP, PBD, Honors Boards, STEM, UTeach, Tower Day	Alabama Clean Water Coalition, Middle Chattahoochee Water Coalition and Chattahoochee/Chipola Water Partner
Institutional Review Committee	Gopher Tortoise Council
Salary Study Committee	
Budget Advisory Committee	
Strategic Planning Committee	
Shared Governance Committee	
Degree Works Committee	

Biology faculty members chair and serve leadership roles in many of the committees and organizations listed above. In addition, faculty members are active at the Department level maintaining and improving the herbarium and museum, adding to and upgrading our CSU webpage and Facebook page, as well as reevaluating space utilization and developing an MS in Biology. Biology faculty members oversee two student organizations for Biology majors, the Beta Beta Beta National Honor Society in Biology and the American Medical Student Association. Faculty meet and welcome new majors at visitation and orientation as well as honoring our graduates with an annual end of the year graduation celebration held at Lynn Haven Nature Preserve. We strive to maintain contact and communication with our alumni through the annual newsletter. (Appendix 7. Faculty member service & Newsletters 2010, 2011 & 2012)

Program Improvement Plans

Faculty Members are encouraged to carefully balance teaching, research and service. With that in mind, service should be prioritized that enhances the Biology program, our students and the interests of our faculty. Departmental Newsletters are sent to all Columbus and surrounding county high school biology faculty or departments as a recruiting tool. In addition, faculty members offer to present at local HS biology clubs or other HS programs.

II. E. Quality of Faculty and Student Achievements.
Assessment of Indicator: Very Strong

Faculty Honors - Honors earned by Biology Department faculty members include: (Newsletters)

2007 CSU Faculty Writing Fellow – John Barone
2007 District II Outstanding BBB Advisor - Julie Ballenger
2008 CSU Outstanding Teacher of Writing Award – John Barone
2008 CSU Educator of the Year Award Nominee – John Barone
2008 CSU Educator of the Year Award Nominee – Jeff Zuiderveen
2008 CSU Educator of the Year Award Nominee – Kevin Burgess
2009 CSU “Outstanding Teacher” award recipient from the CSU women’s soccer team – Jeff Zuiderveen
2009 Board of Regents of the University System of Georgia “Shining Star” Award – Kevin Burgess
2009 CSU Educator of the Year Finalist – Monica Frazier
2010 CSU Sabbatical – John Barone
2010 CSU Faculty Research & Scholarship Award Winner – Kevin Burgess
2010 CSU Faculty Service Award Finalist – Katey Hughes
2010 CSU Faculty Emeritus – George Stanton
2010 Fort Hays State University Alumni Achievement Award Winner – Julie Ballenger
2010 District II Outstanding BBB Advisor - Julie Ballenger
2011 CSU Faculty Emeritus – Bill Birkhead
2011 CSU “Outstanding Teacher” award recipient from the CSU women’s soccer team – Jeff Zuiderveen
2011 CSU Educator of the Year Award Nominee – Kevin Burgess
2011 Phi Beta Delta Outstanding Faculty in Study Abroad – Julie Ballenger
2011 CSU Faculty Research Award finalist – Kevin Burgess
2012 CSU College of Letters and Sciences Fellow for Outstanding Teaching – John Barone
2012 CSU College of Letters and Sciences Faculty Fellow for Outstanding Research – Kevin Burgess
2012 CSU Faculty Research & Scholarship Award finalist – Kevin Burgess

2012 CSU Faculty Service Award finalist – Brian Schwartz
2012 CSU Faculty Center Fellow – Katey Hughes

Student Honors - Honors earned by Biology Department undergraduate students include: (Newsletters)

2007 Wesley Ker-Fox 2nd Place Brooks Award, BBB regional meeting
2007 Lauren Eklund 3rd Place Brooks Award, BBB regional meeting
2007 Contessa Bowman 3rd Place Johnson Award, BBB regional meeting
2008 Linda Bomboka Honorable Mention Brooks Award, BBB regional meeting
2008 Eunice Yu 2nd Place Johnson Award, BBB regional meeting
2008 Melissa Redmond, finalist 2008 CSU Faculty Cup
2009 Meredith Gilbert 2nd Place Brooks Award, BBB regional meeting
2009 Kimberly Sheena Holley and Amanda Holley, finalists 2009 CSU Faculty Cup
2010 Nakita Burden 2nd Place Johnson Award, BBB regional meeting
2010 Jennifer Silvers 3rd Place Johnson Award, BBB regional meeting
2010 De'smond Henry CSU Student Employee of the Year
2011 Roma Patel recipient of 2011 CSU Faculty Cup
2011 Nylvia Ware 1st Place Johnson Award, BBB regional meeting
2011 Cristina Caldwell Columbus Water Works Outstanding Environmental Science Undergraduate Student
2012 Mfoniso Umoren 3rd place Johnson Award, BBB regional meeting
2012 Terry Langfitt 3rd place Frank G. Brooks Award, BBB regional meeting
2012 Neena Alex 2nd place Frank G. Brooks Award, BBB regional meeting, **finalist 2012 CSU Faculty Cup**
2012 Jason Harrison (B.S. Biology 2000) CSU College of Letters & Sciences Alum of the Year for Sciences and Mathematics.

Student recipients of Biology Department Awards include: (Newsletters)

George Stanton Biology Award – awarded to an outstanding biology major that not only excels in their course work but also in the area of service to the department, college, university and community.

2007 Tiffany Taylor (Biology Award)
2008 Michael Winstead (Biology Award)
2009 Kimberly Sheena Holley
2010 Stewart Helton
2011 Nylvia Ware
2012 Neena Alex

Biology Education Award – awarded to those students outstanding in the area of Biology and Secondary Education

2007 Shanna Ryan
2008 Keshia Whitmer
2009 Diana Humphries
2010 Katherine Moultrie
2012 Carrie Ann Sharritt

Cellular & Molecular Biology Award – awarded to those students outstanding in the area of cellular or molecular biology with the recognition of excellence either in the classroom and lab or in their senior research project.

2007 Wesley Ker-Fox
2008 Melissa Redwood
2009 Melissa Mills
2010 Samantha Nieves
2011 Roma Patel
2012 Hemalata Mandiga

Ecological & Evolutionary Biology Award - awarded to those students outstanding in the area of ecology or molecular biology with the recognition of excellence either in the classroom and lab or in their senior research project.

2007 Melissa Craft
2008 Cristina Caldwell
2009 Amanda Holley
2010 Amy Schabel

2011 Cristina Caldwell
2012 Scott Whitley

Organismic Biology Award - awarded to those students outstanding in the area of organismic biology with the recognition of excellence either in the classroom and lab or in their senior research project.

2007 Shanna Ryan
2008 Megan Kirksey
2009 Meredith Gilbert
2010 Nakita Burden
2011 Lauren Neil
2012 Shannon Tyler

Achievements (Licensure, Certification, Admission to Graduate School, Job offers, etc.)

We have been able to determine career paths for 71 of our 148 students who graduated between summer and 2007 to spring 2012. This information is summarized in the table below.

New career paths not recorded in previous assessments are noted in red.

Occupation	Number of Graduates
Graduate School (Science)	9
Medical School	9
Teacher	7
Medical Technician (Optometry, Pharmacy, etc.)	6
Pharmacy School	6
Professional School (Public Health Professions)	5
Nursing	5
Sales / Customer Service	4
Veterinary School	3
Dental School	3
Conservation Biology	3
Laboratory Technicians	2
Photographer	2
Graduate School (Education)	1
Environmental Research / Consulting	1
Military	1
Graduate School (Business)	1
Forensic Research	1
Construction	1
Veterinary Technician	1

The graduates we were able to contact are gainfully employed or are being trained for a career. Most of our students go to graduate or medical school. In the past, teaching was the most popular career choice for biology graduates. However, the available data shows a shift from teaching into graduate or medical school. According to US Bureau of Labor Statistics Occupational Outlook Handbook 2010-2020 (updated March 2012), the jobs predicted to have the greatest area of growth are in the areas of human and animal health. The demand for dentists is predicted to increase by 21%, physicians and surgeons by 24%, pharmacists by 25% and veterinarians by 36%. In addition, as increasing demands are placed on the environment the need for environmental and ecological specialists is expected to increase as is the need for zoologists and wildlife biologists to study the impact of human population growth on our remaining natural areas.

II. F. Quality of Curriculum
Assessment of Indicator: Very Strong

Relationship between Program's Curriculum and Its Outcomes
Assessment of Indicator: Very Strong

In 2010 the faculty members were asked to carefully consider the areas and topics they cover in each course they taught. The goal was to align the program curriculum with the program outcomes and to compare the topics covered in the Biology Major Field Test to those deemed most important in our program. The result was that we refined our program outcomes and carefully considered how each would be measured (program outcomes listed in section 1, Brief Program Overview, Program Mission and its Relation to CSU Mission). We determined that there was approximately 95% concurrence between subjects in our program and those covered on the Biology Major Field Test. (Appendix 9. Biology program and MFT topics)

Senior Biology majors as well as our Alumni were asked "Please rate the quality of preparation towards career and/or graduate studies". The seniors rated their preparation at 4.10/5.0 (N=20) and alumni at 4.05/5.0 (N=37).

Incorporation of Technology
Assessment of Indicator: Above Average

Biology faculty members have developed a 1000-level hybrid course and a 5000-level fully on-line course for Biology majors. In addition, most faculty members utilize CougarView to post supplemental material, including study and review materials, recorded lectures (Wimba), and asynchronous discussions.

Biology majors use a variety of data analysis packages such as SPSS, SAS, and Excel in class as well as in their research projects. In their courses and research projects, students use equipment such as BIOPAC, BSL Student-Pro data recorders, automated cell counter, and the Nano-Drop spectrophotometer. They also use technology in procedures such as DNA isolation and characterization, PCR, and DNA sequencing. Students in Principles of Biology use Vernier LabPro systems to collect and analyze data in the lab as well as in the field.

Senior Biology Majors were asked to rate "the use of current technology in instruction." They rated use of technology at 4.2/5.0 (N=20) with 17 out of 20 rating technology use either good or very good.

Utilization of Multidisciplinary Approaches
Assessment of Indicator: Above Average

Biology degrees are multidisciplinary in their course requirements. In addition to standard general education core requirements, all Biology students take at least two math courses (pre-calculus or calculus and statistics) and at least two general chemistry courses. BS students also must take two organic chemistry and two physics classes. BA students must take foreign language through the fourth semester. Many of our BA and BS students also are able to fit biochemistry within their curriculum.

General and discipline-specific writing is integrated within the curriculum. In addition to the required composition classes in area A, Biology majors are required to complete writing assignments in Research Methods and many junior-and senior-level courses. Students practice writing following the standard format for professional papers and presentations in biology. Students also gain practice and confidence in presenting scientific research in many junior- and senior-level classes.

Many local employers (Aflac, TYSYS, Synovus, and Cott) seek Biology majors for employment because they can think critically and communicate concisely both orally and in writing.

Utilization of Multicultural Perspectives
Assessment of Indicator: Very Strong

The CSU Department of Biology has been very successful in developing a strong international program. Since our first class in 1999 on Andros Island in the Bahamas, we have taken over 300 students to various countries. Sites are carefully selected based on being minimally impacted, having a diversity of unique environments, and safety. Andros Island in the Bahamas, Botswana, Belize, Australia and Costa Rica are countries where we have offered ecology-based courses. The courses are cross-listed so as to count in area D (BIOL 1225) for majors and non-majors and in area G (5535 for level Biology majors and graduate students). Students learn the flora and fauna of an area and conduct short-term ecological studies. Data collected on site are analyzed upon return and presented to audiences at CSU. Research reports normally are sent back to host sites for their use.

The first CSU service-based course was offered in 2007 on Andros Island. Students spent the first part of spring semester studying the effects of diabetes (a common ailment in the Bahamas) and collecting supplies and donations from Columbus clinics and hospitals. Students then went to Andros over spring break and worked in the clinics each

morning. Andros is minimally populated and does not have a hospital; instead, it has three clinics staffed by nurses and one doctor. Students met with locals, shared their knowledge and insights and at the same time learned of other health issues facing Bahamians.

In 2007, Biology students and faculty were part of an international learning community, World Without Borders. All senior Biology majors and faculty teaching the senior capstone course took part in the National Geographic Genographic project in which we sent in DNA samples and tracked the journey of our ancestors out of Africa over tens of thousands of years.

In spring 2009 students in Anatomy and Physiology I were part of an international learning community "Building Healthy Communities in a World Without Borders".

Program Improvement Plans

There are several initiatives that have been proposed and are underway or in the planning stages. For example, we have proposed adding an associate's degree in biology for those students pursuing a doctoral degree in pharmacy. Many of these students take prerequisite courses at CSU and transfer to pharmacy schools without completing a bachelor's degree. These students would have the opportunity to leave CSU with an associate's degree, and CSU and Biology would be credited with a completion success. Second, we have proposed the development of a new competitive premedical program through the COLS that would align us with the goal of becoming Georgia's premier pre-medical program. This program will enhance the experience for those students on the pre-medical track and encourage well prepared high school students interested in medicine to make CSU Biology their first choice. Lastly, we are developing a Master of Science in Biology to serve graduates of our program and other programs in the region who are interested in pursuing graduate education in biology.

Recently, we have developed four new international courses: (1) A comparison of health issues and health care coverage between England and the US; (2) The life of Darwin and his personal and public struggles as he developed his theory of evolution; (3) The ecology and biodiversity of Ecuador and the Galapagos Islands; (4) The ecology and biodiversity of Tanzania, which will include visits to the Serengeti, Nogorongoro Crater (and Oldavui Gorge), and a new and less impacted national park called Ruaha.

II. G. Quality of Facilities and Equipment
Assessment of Indicator: Below Average

Availability of Classroom and Laboratory Space
Assessment of Indicator: Below Average

Classrooms are assigned by a computer optimizer program that compiles information such as preferred building, enrollment and specific technology requirement requests. This process usually does not work well and when inappropriate rooms are assigned, faculty can request reassignment. There is one large lecture room on campus (Stanley 203), and this room is heavily utilized by Biology faculty (Biol 1215-Principles of Biology, Biol 1125-Non lab Contemporary Issues in Biology, Biol 2221-Anatomy and Physiology I and ENVS 1105-Environmental Issues) for lectures of 120-168 students. In addition we require several mid-sized rooms (Stan 205,207, 209) with seating capacity of for 72-96 students. Stanley 203 in particular is ill-suited to teaching large classes, but it is the only lecture hall that can accommodate large classes.

Labs are taught in LeNoir Hall and are set up for a maximum of 24 students per lab. Labs are set up with a suite of material and equipment specific to the type of courses taught in each. LeNoir 252 is the most heavily used lab with 18 Principles of Biology labs scheduled in this room per semester. Other labs are less heavily occupied; however, these labs are where many of our junior- and senior-level courses are taught, and they are often utilized by our senior Biology majors conducting independent research projects.

Faculty members in the Department of Biology do not have their own research labs; instead, lab space is shared by faculty members with similar interests and projects along with their students conducting senior projects. Increasing faculty research productivity will require additional space.

The Lynn Haven Nature Preserve is an outdoor laboratory available for Biology faculty and students to conduct research, set up course projects and utilize for field trips. Research and class material is preserved and maintained in the herbarium and museum. Live plant material used in labs and research is maintained in the greenhouse.

Availability of Equipment

Research sites:
- Lynn Haven Nature Center
- Oxbow Meadows Environmental Learning Center

Facilities:
- Molecular Genetics Lab (plant conservation and barcoding)
- Tissue Culture Facility (2D and 3D capabilities)
- Toxicology Lab
- Aquatic Research Labs (2) (snail, mussel and crayfish propagation)
- Greenhouse
- Herbarium (southeastern plant collection)
- Museum (southeastern vertebrate collection)
- Environmental Chambers (2 climate/light/atmosphere controls)
- Neurophysiology Lab
- Microbiology Research Lab

Equipment:
- -80 C and -20 C freezers
- Autoclave
- 10 passenger Vans (2), 4WD Dually Pickup Truck
- Microscopes
- Vernier handheld samplers
- Electrofishing Equipment (Boat and Backpack unit)
- DNA Sequencer
- NanoDrop Spectrophotometer

Program Improvement Plans

Stanley 203 should be improved by updating equipment in the front of the room and improving lighting. These improvements would increase eye contact, faculty control of the room, and interaction between the faculty member and 168 students in attendance. If large lecture sections become popular with other departments, then additional large rooms will be needed.

Those labs in LeNoir Hall that serve Principles of Biology and Anatomy and Physiology classes need additional space in the form of duplication. Each room (LeNoir 252 and 256) are used 5 and 7 days a week respectively. Chairs and equipment need to be updated and replaced.

Equipment needs are greatest in the areas of upper level biology classes and faculty research. Much of what we currently have is heavily used and when these critical pieces of equipment break down, both student and faculty research suffer. For example, the autoclave broke early in the semester causing labs to be cancelled, the electrofishing equipment is not operational and a senior student dependent on this to collect fish samples was forced to modify his project. When our only -80 freezer went down a few years ago, irreplaceable research materials were lost. Other equipment needed to enhance our senior electives and student and faculty research: Scanning Electron Microscope, Lyophilizer, High Performance Liquid Chromatography, refrigerated microcentrifuge, digital imager for microscopes to produce publishable images, real-time PCR machine, rotary evaporator, spectrophotometer, to list just a few of the needed items.

Faculty members need dedicated research space so students conducting senior research are not limited to working in labs where classes are taught and so that faculty members can have dedicated space for their projects. During the summer of 2012, several of the smaller labs were joined and repurposed to allow better use of space. Additional research space will be critical as we move forward with a Master of Science in Biology.

Section Three – Indicators of Program Productivity

Note that some of the data provided by the VPAA's office was not correct. These data have been researched, corrected and confirmed by the VPAA staff. Specifically, the original data did not include faculty instruction in ENVS, ISCI and ITDS courses. Also, the original data included two faculty members from other departments.

III A. Enrollment in Program for Past 5 Years

Assessment of Indicator: Very Strong

The number of Biology majors has increased by 17.6% in the past five years while total baccalaureate enrollment at CSU has increased by just 7.7%. Therefore, the number of Biology majors has increased at a rate 2.5 times greater than the overall growth at CSU, and Biology is now the second largest department on campus. This increase in majors has occurred while full-time faculty members have increased from 13 to just 14 over the same time frame.

Number of Declared Majors - Fall Semester

	2007	2008	2009	2010	2011	5-Year Avg
BA Biology						
Full-Time	51	51	43	44	60	50
Part-Time	26	21	28	23	15	23
Total	*77*	*72*	*71*	*67*	*75*	*72*
BS Biology						
Full-Time	230	249	275	287	289	266
Part-Time	68	70	57	62	77	67
Total	*298*	*319*	*332*	*349*	*366*	*333*
Combined Undergraduate Programs						
Full-Time	281	300	318	331	349	315.8
Part-Time	94	91	85	85	92	89
Total	*375*	*391*	*403*	*416*	*441*	*405*

III B. Degrees Awarded Over Past 5 Years

Assessment of Indicator: Above Average to Very Strong

The data below may indicate that our students are taking 5 or 6 years instead of the traditional 4 years to complete their degree. The numbers indicate that every other year we have a higher number of seniors graduating. This is reflected in the demand for seats in senior-level classes. There has been a potential bottleneck in degree progression at the 3000-level. Students are required to earn a "C" or better in Cell Biology and Genetics before they progress into Ecology and Biosystematics. Cell and Genetics were only offered during the fall semester and Ecology and Biosystematics were only offered during the spring semester. As of spring 2012, we now offer all four classes each semester, allowing more linear progression through the 3000-level classes and, as a consequence, better progression into 4000-and 5000-level classes, and ultimately, graduation.

Number of Degrees Conferred - Fiscal Year

	2008	2009	2010	2011	2012	5-Year Avg
BA Biology	10	8	17	10	8	11
BS Biology	20	14	12	32	17	19
Combined Undergraduate Programs	*30*	*22*	*29*	*42*	*25*	30

III C. Comparison with CSU and University System of Georgia Programs

Assessment of Indicator: Satisfactory (Average)

In comparison with other USG programs, we are below average in the number of students we graduate each year (30 for CSU and an average of 41.4 for USG peer institutions listed below). However, these numbers need to be normalized based on the number of students in each program. Our average of 7 graduates per 100 students enrolled per year is slightly below the average of 9 students per 100 enrolled per year at these peer institutions. We have instituted some program improvements listed in section IIID to improve retention and progression toward graduation.

Baccalaureate Degrees Awarded in Biology Programs at USG State Universities

USG Institution	2007	2008	2009	2010	2011	5-Year Avg
Albany State University	34	27	24	30	42	31
Armstrong Atlantic State University	27	43	44	58	53	45
Augusta State University	33	36	42	42	47	40
Clayton College & State University	28	40	45	56	31	40
Columbus State University	27	30	22	29	42	30
Fort Valley State university	32	33	20	28	36	30
Georgia College & State University	47	35	44	38	54	44
Georgia Southwestern State University	6	9	5	11	13	9
Kennesaw State University	83	102	117	128	120	110
North Georgia College & State University	53	45	43	43	37	44
Savannah State University	27	20	42	20	25	27
Southern Polytechnic State University	12	14	10	13	17	13
State University of West Georgia	68	70	76	90	76	76
Total	*477*	*504*	*534*	*586*	*593*	539

III D. Retention Rates

Assessment of Indicator: Below Average – Satisfactory (Average)

Retention rates in Biology are steady over the evaluation period. Although Biology's retention rate is not significantly different from the University's average, we are not satisfied with our current rate and have initiated several program improvements listed below.

Retention Rates by Baccalaureate Program

Program	2007	2008	2009	2010	2011	Average
Art	61.1%	77.8%	68.2%	76.0%	63.0%	69.2%
Art Education	100.0%	50.0%	50.0%	0.0%	66.7%	53.3%
Biology	69.9%	72.9%	71.7%	69.8%	68.5%	70.6%
Business Programs	69.0%	64.0%	67.3%	72.4%	72.7%	69.1%
Chemistry	78.3%	92.3%	83.9%	70.0%	84.6%	81.8%
Communication	60.9%	61.5%	80.0%	92.3%	84.2%	75.8%
Computer Science/Info Technology	66.7%	75.0%	57.7%	59.5%	75.6%	66.9%
Criminal Justice	70.0%	75.0%	57.9%	63.6%	57.6%	64.8%
Early Childhood Education	66.7%	81.0%	80.0%	72.5%	78.4%	75.7%
Earth & Space Science/Geology	100.0%	50.0%		33.3%	66.7%	62.5%
English Language	95.5%	80.0%	77.8%	85.2%	64.0%	80.5%
Exercise Science	80.0%	66.7%	72.7%	57.1%	73.3%	70.0%
Health & Physical Education	66.7%	75.0%	33.3%	66.7%	50.0%	58.3%
Health Science	100.0%	50.0%	77.8%	86.7%	80.0%	78.9%
History	80.0%	50.0%	44.4%	83.3%	60.0%	63.6%
History & Secondary Education	87.5%	85.7%	40.0%	66.7%	62.5%	68.5%
Mathematics	80.0%	55.6%	56.3%	76.5%	66.7%	67.0%
Middle Grades Education	100.0%	40.0%	66.7%	85.7%	87.5%	76.0%
Modern Language & Culture	71.4%	100.0%		85.7%	100.0%	89.3%
Music Performance	68.4%	85.7%	72.7%	78.6%	84.4%	78.0%
Music Education	100.0%	78.6%	80.0%	86.4%	80.0%	85.0%
Music, General	66.7%	66.7%	62.5%	50.0%	75.0%	64.2%
Nursing	81.3%	77.4%	63.0%	74.7%	65.7%	72.4%
Political Science	58.8%	44.4%	66.7%	70.0%	78.6%	63.7%
Psychology	81.0%	70.6%	61.5%	72.1%	51.1%	67.2%
Sociology	100.0%	60.0%	71.4%	80.0%	50.0%	72.3%
Spec Ed - General Curriculum	0.0%	100.0%	66.7%	66.7%	50.0%	56.7%
Theatre Arts	86.8%	85.2%	73.1%	75.5%	81.1%	80.3%
Theatre Education	72.7%	88.9%	76.5%	80.0%		79.5%
Total Baccalaureate	74.8%	72.5%	*68.5%*	*72.7%*	*70.7%*	71.8%

Biology Initiatives for Retention, Progression and Graduation Improvements

1. Offer all four junior core classes (Cell, Genetics, Ecology and Biosystematics) each semester to allow more entry points into the junior year and to eliminate delays in repeating failed courses.

2. Offer more seats in senior electives each semester and during summer terms to allow students to graduate in a timely manner.

3. Offer internships (in addition to the independent research option) to allow more opportunities for students to complete research requirements without overburdening our faculty (assuming that increase in faculty will not keep up with increase in student enrollment).

4. Provide departmental scholarships for seniors conducting independent research or internship research.

5. Utilize peer leaders to improve student performance in classes with large enrollment.

6. Utilize the Advising Center for Excellence (ACE) for freshman and sophomore Biology majors. This will improve advising for all of our students because each faculty advisor will have fewer students to focus on.

7. Preregister new freshmen during orientation in order to ensure that students are off to the best possible start with appropriate schedules that maximize degree progress.

8. Develop a new associate's degree for pre-pharmacy students to allow them to complete a degree before transferring to a pharmacy program.

9. Develop a Master's of Science in Biology in order to increase our research productivity and improve our reputation and, therefore, help us to recruit better qualified students to our undergraduate programs. Also, it will provide us with more teaching assistants to utilize in lab courses.

10. Expand international field course offerings in order to recruit better qualified students and faculty.

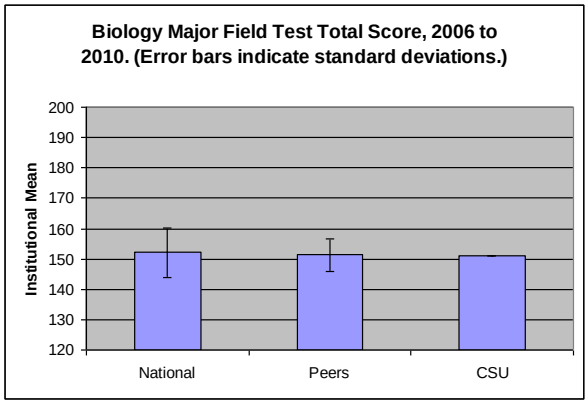
11. Offer group advising meetings for freshman/sophomores and juniors/seniors in order to ensure that our students are on track and to inform them of opportunities in research and international field courses.

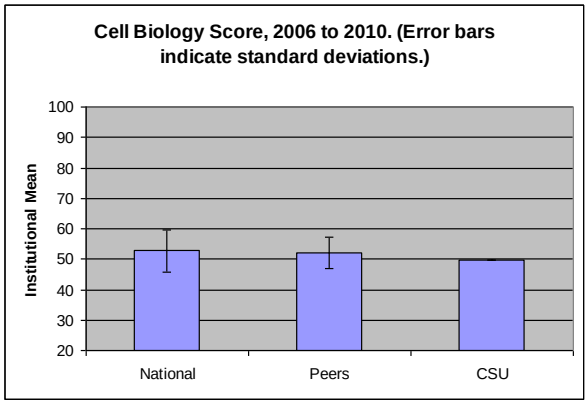
12. Increase offerings of BIOL 4795 (Capstone) from 3 to 4 per year to accommodate a growing number seniors who need the course to graduate.

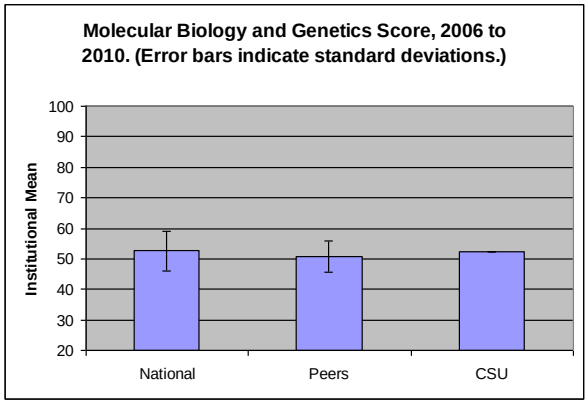
13. More closely monitor Degree Evaluation Records and graduation application lists to ensure that our students are on track and to head off any last-minute problems with graduation.

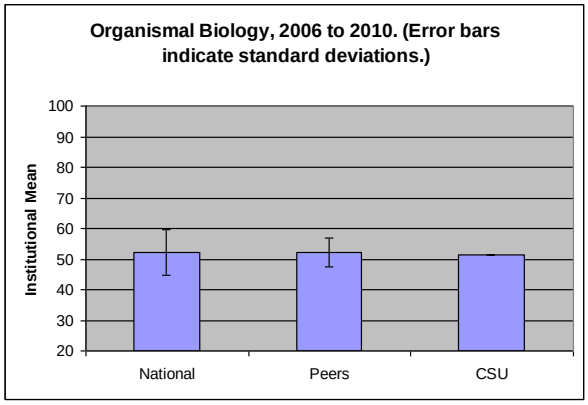
III E. Student Learning Indicators (using a variety of data sources)
Assessment of Indicator: Satisfactory (compared to the national and peer averages)

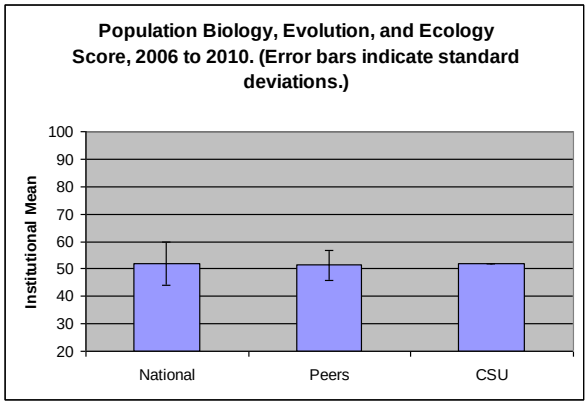
The best indicator of student learning is our seniors' scores on Educational Testing Service's Major Field Test (MFT) in Biology. The Biology MFT assesses students' knowledge and understanding of concepts, theories, and practice in each of the four major sub disciplines: Cell Biology; Molecular Biology and Genetics; Organismal Biology; and Population Biology, Evolution, and Ecology. It also includes questions that assess Analytical Skills (scientific reasoning and data analysis). The test is administered every fall and spring semester to students in our senior capstone course, and the exams are scored in annual cohorts. ETS reports for each student an overall score, scores for each of the four subareas, and various "assessment indicators" including Analytical Reasoning. The graphs below show that CSU students from 2006-2010 performed similarly to students nationwide and to students at 16 peer institutions (listed in Appendix 10).

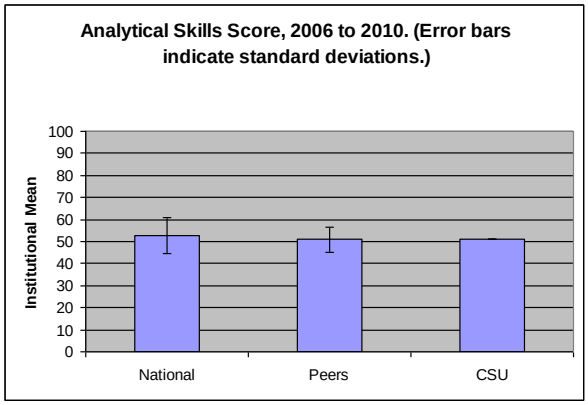












The 2011 cohort performed similarly on a newly revised version of the test (See Appendix 11). Furthermore, our current seniors and recent graduates rated highly the quality of preparation towards career and/or graduate studies. Fifteen out of 20 current seniors indicated that the quality of preparation was good or very good with an average rating of 4.10/5, and 28 out of 37 recent graduates rated quality of preparation as good or very good with an average of 4.05/5.

III F. Graduation Rate of Program

Assessment of Indicator: Below Average - Satisfactory

The graduation rate for the Biology Program varies each year in a manner similar to the number of graduates per year. In 2008 the graduation rate was 27.3%, then increased to 36.7% in 2009 and then fell to 29.5% in 2010. However, the last two years showed an improvement from 37.6% to 39.8%, but that does not necessarily indicate a trend.

To improve the rate of graduation for students earning a Biology degree, the Department has developed several initiatives (complete list under III D.) such as offering all four junior core classes (Cell Biology, Genetics, Ecology and Biosystematics) every semester, allowing students two admission points into the junior core rather than one per year; offering enough seats in the senior-level electives to accommodate graduating seniors; offering a research-based internship option for students interested in hands-on, work-related experiential learning; and providing scholarships to support research and travel to professional meetings.

Six-Year Graduation Rates by Baccaureate Program

Program	2002	2003	2004	2005	2006	Average
Accounting	61.9%	27.6%	39.1%	42.1%	43.5%	42.8%
Art	20.0%	38.5%	27.3%	21.4%	22.2%	25.9%
Art Education	50.0%	0.0%	50.0%	50.0%	0.0%	30.0%
Biology	27.3%	36.7%	29.5%	37.6%	39.8%	34.2%
Chemistry	22.2%	30.8%	45.5%	37.5%	26.1%	32.4%
Communication	37.5%	30.8%	25.0%	47.4%	34.8%	35.1%
Computer Science	16.7%	29.7%	6.9%	34.5%	29.2%	23.4%
Criminal Justice	40.0%	30.4%	36.7%	27.5%	45.0%	35.9%
Early Childhood Education	42.4%	50.9%	44.4%	44.6%	45.1%	45.5%
Earth & Space Science/Geology		100.0%	50.0%	0.0%	50.0%	50.0%
English Language	52.6%	36.0%	35.0%	34.8%	50.0%	41.7%
Exercise Science	40.0%	25.0%	53.3%	38.9%	70.0%	45.4%
Finance	33.3%	66.7%	50.0%	58.3%	36.4%	48.9%
General Business	25.9%	35.1%	37.8%	42.1%	25.0%	33.2%
Health & Physical Education	100.0%	16.7%	11.1%	0.0%	66.7%	38.9%
Health Science	20.0%	10.0%	45.5%	46.2%	12.5%	26.8%
History	40.0%	50.0%	20.0%	27.3%	30.0%	33.5%
History & Secondary Education	33.3%	27.3%	23.1%	0.0%	62.5%	29.2%
Management	18.8%	20.0%	27.3%	42.5%	35.3%	28.8%
Management Information Systems	44.4%	42.1%	44.4%	25.0%	23.1%	35.8%
Marketing	5.9%	33.3%	37.5%	25.0%	31.3%	26.6%
Mathematics	50.0%	63.6%	42.9%	27.3%	33.3%	43.4%
Middle Grades Education	40.0%	33.3%	0.0%	50.0%	100.0%	44.7%
Modern Language & Culture			0.0%	50.0%	28.6%	26.2%
Music Performance	43.8%	56.0%	61.5%	52.4%	52.6%	53.3%
Music Education	34.6%	55.9%	68.8%	65.0%	90.9%	63.0%
Music, General	46.7%	50.0%	40.0%	50.0%	66.7%	50.7%
Nursing	47.0%	47.4%	53.7%	32.2%	42.7%	44.6%
Political Science	46.7%	26.9%	28.6%	39.1%	17.6%	31.8%
Psychology	20.7%	32.0%	25.0%	27.8%	35.7%	28.2%
Sociology	50.0%	0.0%	66.7%	33.3%	33.3%	36.7%
Spec Ed - General Curriculum	66.7%	50.0%	0.0%	50.0%	0.0%	33.3%
Theatre	42.9%	25.0%	35.7%	34.8%	47.4%	37.1%
Theatre Education	20.0%	33.3%	55.6%	62.5%	54.5%	45.2%
Total Baccalaureate	*34.6%*	*37.5%*	*37.1%*	*37.1%*	*40.3%*	37.3%

III G. Cost Effectiveness of Instructional Delivery
Assessment of Indicator: Very Strong

As cost-per-credit-hour of instruction for CSU has increased from $193 - $208 over five years, the cost-per-credit-hour of instruction in Biology has decreased from $197-$136 over the same time period. This decrease in cost is due to the increase in the number of seats at the 1000-level, where lecture sections have increased by 53.6% and an increase in the number of seats at the 2000-level, where the lecture sections have increased by 22.6%. The increase in lecture capacity has only been possible with the use of student teaching assistants from the Environmental Science Master's program employed to teach the increased number of lab sections. The improvement in cost effectiveness is not necessarily reflected in improved learning, and we are currently employing techniques for improved learning while maintaining large lecture sections.

Instructional Costs - Biology, 2008-2012

	Fiscal Year					
	2008	**2009**	**2010**	**2011**	**2012**	**5-Year Avg**
State Funds Costs	$1,281,713	$1,284,732	$1,244,498	$1,333,196	$1,374,909	$1,303,810
Grant Funds Costs	$5,115	$23,410	$41,925	$66,091	$8,782	$29,065
Total Costs	**$1,286,828**	**$1,308,142**	**$1,286,423**	**$1,399,287**	**$1,383,691**	**$1,332,874**
Total Cost Per Major (Total Costs/Number of Declared Majors	$3,432	$3,346	$3,192	$3,364	$3,138	$3,294
State Funds Costs Per Major (State Funds Total/Number of Declared Majors)	$3,418	$3,286	$3,088	$3,205	$3,118	$3,223
Credit Hours Taught Fall and Spring Semesters	6,532	7,966	8,815	9,663	10,159	8,627
Cost per Credit Hour - Total Expenditures	$197	$164	$146	$145	$136	$158
Cost per Credit Hour - State Funds	$196	$161	$141	$138	$135	$154

Section Four – Program Viability

IV. A. Summary of Program's Viability

Reference Supporting information previously presented in this report

The Biology Program at CSU is very viable. The number of students selecting Biology as their major continues to grow. Our program encourages Biology majors to grow as professional scientists, conducting research (in classes and independently), and presenting their research at professional meetings.

Our senior Biology majors when surveyed rate the quality of instruction in Biology courses at CSU good to very good (16/20) and 20 agree to strongly agree that their degree in Biology has had a significant positive effect in their lives.

We have a talented team of faculty members in the Biology Department. We are innovative in course preparation and look for improvement in our course delivery to improve student success. We are active professionally and encourage our students to follow our lead applying for grants, presenting their research and publishing their findings. We have added new courses in the area of senior electives when needed and faculty expertise is available (e.g. Histology). We continue to develop new ecology-based or health-related international courses due to student demand and faculty desire.

Our faculty members are recognized and honored for their pedagogy, research and service by their colleagues and our students at the annual Honors Convocation and in other award ceremonies beyond this campus. Our students garner local, regional and international awards for their research and service.

The number of students being accepted into professional and graduate programs is a testament to the rigor of our program and that our students are well prepared to succeed beyond CSU.

The Department of Biology not only prepares our majors for success beyond CSU, but we also serve our campus in preparing students to succeed in the CSU Nursing Program (A&P I, A&P II, Microbiology for Health Sciences) as well as provide Area D lab sciences for a majority of CSU students (over 900 seats in Principles of Biology each year).

As college costs continue to increase, costs for Biology credits have decreased, making our courses and our program highly valuable and an effective use of tuition dollars.

Summarize recommendations for the future of the program

1. Associate's degree in biology for those students pursuing a doctoral degree in pharmacy. Pre-pharmacy students are not required to complete a four-year degree before entering into pharmacy school, and many complete three years or more and leave CSU without a degree and then successfully complete their pharmacy program. An associate's degree will allow them to leave with a valuable degree and provide CSU with a completion success.
2. Competitive pre-medical program through the COLS that would align us with the goal of becoming Georgia's premier pre-medical program and will enhance the experience for those students in the pre-medical track and encourage well prepared high school students interested in medicine to make CSU Biology their first choice.
3. Master of Science in Biology to serve our graduates interested in furthering their graduate education in biology.
    a. Prioritize a reduction in teaching loads for those active in research and mentoring graduate students.
    b. Create a state-funded position for Elizabeth Klar to free lab fee funds to be used for MS teaching assistant stipends.
    c. Hire faculty as needed to enhance diversity of courses required in the advanced degree and to accommodate a growing number of Biology majors.

In summary, the Biology Program is an important part of the CSU degree spectrum. We train future doctors, nurses, dentists and pharmacists. We train those that will care for our animals, large or small, exotic or standard couch warmers. We train those that will protect our environment and the native fauna and flora. We train students to think critically and communicate concisely.

Include timetable for program change

1. Associate's degree has been approved by the COLS curriculum committee and is now under consideration at the University level. Support for this degree has been voiced from the Provost's office.
    a. If supported, this could be instituted in fall 2013.
2. Competitive pre-medical program has been supported in the COLS and by the Provost and President. Requests for funding and scholarships are underway.
    a. If supported, this will be instituted in fall 2013.
3. Master of Science in Biology has been supported at the COLS curriculum committee. It will be presented to the Graduate Council and, if supported, will be considered by the University Curriculum Committee before it can leave CSU for consideration at the state level.
    a. If supported, implementation would be fall 2014.

IV. B. Summary of Program Improvement Plan

Reference recommendations previously made in this report

Program improvement plans are as follows:

1. Offer a Master of Science in Biology.
    a. We have 441 majors, many of whom will elect to stay and continue their senior research and develop their project into a publishable piece of work.
    b. Having a Master's program increases the professional activity within the department of both the faculty members and the undergraduates.
    c. Move Elizabeth Klar off lab fee funds to a state supported line. This will free lab fees to serve as a stipend for graduate students teaching the labs.
    d. Hire a lecturer to allow a permanent course load reduction for those faculty members active in research and mentoring graduate students.

2. Develop the competitive pre-medical program to support and enhance the educational experience for those in the pre-medical program and provide opportunities to enhance their success when applying to medical schools (MCAT study guides, medical school visits, shadow programs with physicians, etc). This will also serve to recruit well prepared students to CSU.
3. Improve the advising and registration experience for incoming freshman with pre-enrollment, advising at the Academic Center for Excellence and group advising sessions each fall for freshman and sophomore biology majors.
4. Support senior research in the form of independent research projects or research-based internships, including funding to support students' and faculty members' travel to professional meetings.
5. Improve research lab space for faculty members and their students as well as purchase equipment required to conduct research.
6. Offer an associate's degree in pre-pharmacy for those students seeking entrance to a doctoral degree in pharmacy and who don't need or want to complete a four-year degree at CSU

Specify initiatives/actions to be implemented

Things we can do immediately

1. Implement the associates degree for pre-pharmacy students if approved.
2. Support and develop senior research-based internships.
3. Continue with advising improvements.

Things that will require funding

1. Hire a lecturer or any additional faculty to reduce teaching loads to allow for more research and mentoring of undergraduate and/or graduate research.
2. Create a state-funded position for Ely Klar to allow labs fees to be used to support graduate teaching assistants.
3. Increase lab space for teaching and research and purchase equipment needed to enhance both.
4. Develop a competitive pre-medical program that provides scholarship and supplemental materials focused on successful entrance for CSU students into medical school.
5. Additional funding to support student and faculty travel to professional meetings.

Include timetable for program change

1. Implement the associates degree for pre-pharmacy students if approved – **waiting on approval**
2. Implement a Master of Science in Biology **– waiting on approval**
3. Support and develop senior research-based internships – **currently underway**
4. Continue with advising improvements – **currently underway**
5. Hiring a lecturer or any additional faculty to reduce teaching loads to allow for more research or mentoring of undergraduate or graduate research **– based on the number of student credit hours generated. This is a critical need but is dependent on availability of funds.**
6. Moving Ely Klar's salary from labs fees to a state-funded line to allow labs fees to serve as graduate teaching assistant stipends - **Based on the number of student credit hours generated, this is a critical need but is dependent on availability of funds. This will allow TA stipends for possible MS program.**
7. Increase lab space for teaching and research and purchase equipment – **requires funding**
8. Develop a competitive pre-medical program that provides scholarships and supplemental materials focused on successful entrance into medical school **– under development, funding sought**
9. Additional funding to support student and faculty travel to professional meetings **– requires funding**

Address any new or reallocated resources to implement improvement plan

1. If approved, an MS in biology would require
    a. Lab money freed to pay teaching assistant stipends (move Elizabeth Klar to a state line)
    b. Hire a lecturer/new faculty member to reduce teaching loads diversify areas of expertise

2. Add research and teaching lab space and research equipment
3. Increase travel to professional meetings for students and faculty members

The Department of Biology has met and/or exceeded every request made by our current administration. We were asked to increase lecture size in Biol 1215, Principles of Biology, and we met that request by increasing the number of seats over the past five years from an average of 310 to over 420 each semester. We were asked to increase the number of spaces for pre-nursing students and students in other health related programs in A&P I, A&P II and Microbiology for Health Professionals, and we met that challenge by increasing seats over the past five years from an average of 290 to 420 in A&P I, from an average of 130 to 212 in A&P II and from an average of 285 to 385 in the Microbiology class. In addition, we have been asked to increase professional activity with no reduction in teaching load and little increase in research space or equipment. Again, we have done our best to creatively meet this request and have published or co-authored over 36 publications in the past five years. It is time to reward the faculty in the Biology Department for their willingness to step up and meet each new challenge. We have reached the limit where there is no way for us to increase what we are doing, to grow as a department, to add to our program or grow professionally as individuals. Program improvements will require support and dedicated financial commitment from the leadership on this campus.

Appendix 1. CSU Biology Current Students Survey 2012

1. Please rate the quality of instruction in biology courses at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	0	4	8	8	4.20	20
						answered question	20
						skipped question	0

2. Please rate the availability of required courses in biology at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	1	4	12	2	1	2.90	20
						answered question	20
						skipped question	0

3. Please rate the range and variety of courses in biology at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	1	0	10	9	0	3.35	20
						answered question	20
						skipped question	0

4. Please rate the times and days classes in biology were scheduled at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	1	3	7	8	1	3.25	20
						answered question	20
						skipped question	0

5. Please rate the relevance of biology courses at CSU to your career goals.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	4	4	9	3	3.55	20

						answered question	20
						skipped question	0

6. Please rate the fairness of testing and grading systems in biology courses at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	1	2	11	6	4.10	20
						answered question	20
						skipped question	0

7. Please rate the accessibility and ease of contacting biology faculty at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	0	1	8	11	4.50	20
						answered question	20
						skipped question	0

8. Please rate the quality of preparation towards career and/or graduate studies.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	0	5	8	7	4.10	20
						answered question	20
						skipped question	0

9. Please rate the quality of academic advising in biology at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	2	3	6	9	4.10	20
						answered question	20
						skipped question	0

10. Please rate the quality of relationships with biology faculty at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count

	0	0	1	8	11	4.50	20
						answered question	20
						skipped question	0

11. Please rate the quality of relationships with other students in biology at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	0	2	4	14	4.60	20
						answered question	20
						skipped question	0

12. Please list two changes you would make in the biology program at CSU that would have

Answer Options	Response Count
	19
answered question	19
skipped question	1

12. Comments:
1. More classes relatabel to pre-med students (i.e., histology, biochemistry are relatable but maybe a pathology or studies in common diseases: cancer, CV, or diabetes).
2. Technology in classroom (record lecture and comments on PowerPoint to post as study aids.
Have a freshman learning community for biology majors. There wasn't one when I started and had to take a health science FLC.
1. Offer more medically centered courses.
2. Offer required courses every semester.
1. Offer classes in both fall and spring if possible.
2. More options for 5000 level courses.
1. Availability of required courses.
2. Different courses offered fro different career paths.
1. Have more diverse courses offered each semester.
2. Make the foreign language courses stop at 2001.
1. Cheaper price.
2. Easier to graduate on time by having a chance to take any class in any semester.
1. I think it would be beneficial to offer classes, especially core classes, at more than one time each semester, in order to reduce scheduling conflicts.
2. I think it would be nice to offer more lab based biology courses (as opposed to field based courses).
My experience has been good. I don't think I would change anything.
1. Offer more senior level classes in one semester.
2. For some classes, it would be great to increase the number of seats available to the students.
1. Better advising regarding classes , if you don't know a class is only offered in spring, you can get a year behind.
2. Internship seminars/assistance.

13. What would you do if you had it to do over again?

Answer Options	Response Percent	Response Count
I would still choose to major in biology a CSU.	65.0%	13
I would major in biology, but at a different institution.	25.0%	5
I would choose a major other than biology.	10.0%	2
	answered question	20
	skipped question	0

14. Did you begin college as a biology major?

Answer Options	Response Percent	Response Count
Yes	95.0%	19
No	5.0%	1

answered question	20
skipped question	0

15. Did you transfer to CSU from another institution?

Answer Options	Response Percent	Response Count
Yes	35.0%	7
No	65.0%	13
answered question		20
skipped question		0

16. Of the undergraduate biology courses you took, what percentage of them did you take at CSU?

Answer Options	Response Percent	Response Count
All of them (100%)	70.0%	14
Most of them (more than 60%)	25.0%	5
About half of them (40% to 60%)	0.0%	0
Less than half of them (less than 40%)	5.0%	1
answered question		20
skipped question		0

17. If it took longer than 4 years to complete your degree, which of the following is the most important reason? Circle one.

Answer Options	Response Percent	Response Count
This does not apply to me.	35.0%	7
I withdrew or did not enroll for one or more semesters.	5.0%	1
I took a reduced course load some semesters.	5.0%	1
I switched majors or degrees.	5.0%	1

1. Hire more professors.
2. Offer more upper level classes.
Offer certain classes at different times/days.
1. Increase class sizes in upper level classes (5 more students or so).
2. Different classes in upper level.
1. Wider variety of courses available.
2. More advanced technological (lab) equipment for better research opportunities.
1. Classes sometimes hard to fit in schedule or not enough seats.
2. Advising seemed disorganized sometimes and not easy for professors/advisors or students.
1. The time classes are offered.
2. More openings for register.
1. More major classes offered in a semester.
2. Classes start at later times.
1. I would offer every class year round, not just for 1 semester.

17. Other (please specify):
Changed schools and many (over 8) classes did not transfer.
[Completed a] Minor.
I transferred from another school and the majority of my classes were not transferred.
All of these played a factor except #3.
I half-assed my way through most of my classes.

Required courses were not available when I needed them.	20.0%	4
I had to repeat one or more courses.	5.0%	1
Other (please specify)	25.0%	5
	answered question	20
	skipped question	0

18. Which best describes what you did (or are doing) immediately after graduating from CSU?

Answer Options	Response Percent	Response Count
I am or plan to be employed in a field related to biology immediately after graduation.	20.0%	4
I am or plan to be employed in a field unrelated to biology immediately after graduation.	0.0%	0
I will pursue graduate education in biology or a closely related field immediately after graduation.	25.0%	5
education in a field other than biology immediately after graduation.	0.0%	0
I will pursue a professional degree (MD, JD, DDS, etc.) immediately after graduation.	50.0%	10
Other (please specify)	5.0%	1
	answered question	20
	skipped question	0

18. Other (please specify):
Undecided [between 1 and 3]
I will begin work as a biology teacher and pursue higher education in a field other than biology.

19. Please rate your agreement with the following: My degree in biology has had a significant positive effect in my life.

Answer Options	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Rating Average	Response Count
	0	0	0	9	11	4.55	20
						answered question	20
						skipped question	0

20. Please rate the use of current technology in instruction							
Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	0	3	10	7	4.20	20
						answered question	20
						skipped question	0

Appendix 1. CSU Biology Alumni Survey 2012

1. Please rate the quality of instruction in biology courses at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	0	1	11	25	4.65	37
						answered question	37
						skipped question	0

2. Please rate the availability of required courses in biology at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	4	10	18	5	3.65	37
						answered question	37
						skipped question	0

3. Please rate the range and variety of courses in biology at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	2	0	6	18	10	3.94	36
						answered question	36
						skipped question	1

4. Please rate the times and days classes in biology were scheduled at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	1	2	10	11	13	3.89	37
						answered question	37
						skipped question	0

5. Please rate the relevance of biology courses at CSU to your career goals.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	1	1	7	10	18	4.16	37
						answered question	37

						skipped question	0

6. Please rate the fairness of testing and grading systems in biology courses at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	0	2	13	22	4.54	37
						answered question	37
						skipped question	0

7. Please rate the accessibility and ease of contacting biology faculty at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	1	0	0	14	22	4.51	37
						answered question	37
						skipped question	0

8. Please rate the quality of preparation towards career and/or graduate studies.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	2	1	6	12	16	4.05	37
						answered question	37
						skipped question	0

9. Please rate the quality of academic advising in biology at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	1	9	9	18	4.19	37
						answered question	37
						skipped question	0

10. Please rate the quality of relationships with biology faculty at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	1	2	6	28	4.65	37
						answered question	37

skipped question	0

11. Please rate the quality of relationships with other students in biology at CSU.

Answer Options	Very Poor	Poor	Fair	Good	Very Good	Rating Average	Response Count
	0	0	5	13	19	4.38	37
						answered question	37
						skipped question	0

12. Please list two changes you would make in the biology program at CSU that would have most

Answer Options	Response Count
	26
answered question	26
skipped question	11

13. What would you do if you had it to do over again?

Answer Options	Response Percent	Response Count
I would still choose to major in biology a CSU.	60.0%	21
I would major in biology, but at a different institution.	11.4%	4
I would choose a major other than biology.	28.6%	10
answered question		35
skipped question		2

14. Did you begin college as a biology major?

Answer Options	Response Percent	Response Count
Yes	74.3%	26
No	25.7%	9
answered question		35
skipped question		2

12. Comments:
offering certain courses the entire year, thereby not having to DELAY GRADUATION. This is the only campus I know of that, for example, that seems to limit part one of sciences classes almost exclusively for fall and part two almost exclusively for the spring. Seriously?
Make biochemistry and calculus a requirement for the premed program. I was told by my advisor I didn't need it for GA schools, but in the end in it was almost vital to have them in order to be competitive. AND for other science degrees everywhere else they're pretty much required. I found that most lab jobs I was applying for required biochem.
Expanded the faculty to be able to provide a wider range of Biology course (i.e. course that incorporate biology with social sciences), promote study abroad course more heavily (they are a great learning experience)
These are personal changes and not directly dealing with the biology courses at CSU but I would offer classes in physics that were more geared toward biologists, something with a curriculum that emphasized the importance of physics in our field. The instructors for chemistry and physics were very limited.
Better faculty/staff relationship
More tutorial sessions
1. Offer some biology classes at night.
2. Change of prerequisite classes
More class options, both contents and times
Provide specific courses to further assist premedical student planning to take the MCAT.
Organize more clubs and events for the science department that requires student and faculty involvement.
Provide more help towards preparing for MCAT
Some teachers would place materials on the exams that were not covered in class and it was like they were setting us up for failure.
2) Better technology (Dr. Brian Schwartz is a very good teacher. He was always available to help you and it was obvious he is passionate about his job.)
More classes available in the evenings
Better handling and explanation of research. Most importantly how money is handled and acquired. There was no other place to put this so I'm putting it here, on question 13 I answered no because of the financial aid department, which is run terribly and is inefficient.
Make the 55 level class and lab times more feasible.
Human Anatomy should be a requirement for the pre-med program.
A biostatistics course for majors.
Required courses would be available during Fall and Spring semesters. No other changes needed.
study groups, more graduate level classes

15. Did you transfer to CSU from another institution?

Answer Options	Response Percent	Response Count
Yes	31.4%	11
No	68.6%	24
answered question		35
skipped question		2

16. Of the undergraduate biology courses you took, what percentage of them did you take at CSU?

Answer Options	Response Percent	Response Count
All of them (100%)	71.4%	25
Most of them (more than 60%)	28.6%	10
About half of them (40% to 60%)	0.0%	0
Less than half of them (less than 40%)	0.0%	0
answered question		35
skipped question		2

17. If it took longer than 4 years to complete your degree, which of the following is an important reason? Select all that apply.

Answer Options	Response Percent	Response Count
This does not apply to me.	46.7%	14
I withdrew or did not enroll for one or more semesters.	33.3%	10
I took a reduced course load some semesters.	26.7%	8
I switched majors or degrees.	16.7%	5
Required courses were not available when I needed them.	26.7%	8
I had to repeat one or more courses.	13.3%	4
Other (please specify)	20.0%	6
answered question		30
skipped question		7

study groups, more graduate level classes
more student-advisor interaction
More vaired coursework in biology.
Evening courses(for Working people) and more Marine Biology type courses
I have interest in genetics. There were only a few courses available to select from that were related to this field. I learnt some valuable techniques in these courses but wanted some more opportunities to continue learning and developing more on these techniques. Also, it would be helpful to have a course that focuses more on field techniques. Now beginning course work in a graduate program, field experience provided by ecology has served very useful. More courses offering experience in field work would be extremely helpful in future employment and education.
More support from CSU to the bio department!
Better organic chem professors
Easy transition courses for transfer students
1. Offering more of the required courses during both semesters, instead of just in Spring or just in Fall.
2. Having a meeting with rising seniors during their junior year to detail out all of the graduation requirements, in order to ensure that less people have confusion during the semester they graduate.
For those interested with Pre-Medical route, try to make courses more readily available during the Fall and Spring semesters.
More available night classes and more upper level variety.
More faculty would allow for more classes, which would allow for better flexibility with scheduling... so, get more money, and get a bigger building.
get a school president who would rather fix up old buildings than spend several hundreds of

17. Other (please specify):
In CSU's case required courses were not available when needed.
I had to repeat General Chemistry, which caused me to graduate a year later, because the 2 part course was only offered once per year, beginning in the Fall.
minor
I had a minor degree.
As a transfer student, I needed to complete course requirements part of CSU's biology program. I also took extra time to complete my undergrad research project.
I had to stay an extra semester to finish my senior research project.

18. Which best describes what you did (or are doing) immediately after graduating from CSU?

Answer Options	Response Percent	Response Count
related to biology immediately after graduation.	29.0%	9
I am or was employed in a field unrelated to biology immediately after graduation.	9.7%	3
I enrolled in graduate education in biology or a closely related field immediately after graduation.	16.1%	5
I enrolled in graduate education in a field other than biology immediately after graduation.	19.4%	6
I pursued a professional degree (MD, JD, DDS, etc.) immediately after graduation.	25.8%	8
Other (please specify)	12.9%	4
	answered question	31
	skipped question	6

18. Other (please specify):
I am pursuing a professional degree.
Still looking for a job
Worked for one year; currently pursuing a professional degree following the one year off.
I am stubbornly looking for work exclusively related to bio, but in the meantime I survive by day trading penny stocks online.

19. Please rate your agreement with the following: My degree in biology has had a significant positive effect in my life.

Answer Options	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Rating Average	Response Count
	0	1	2	7	25	4.60	35
						answered question	35
						skipped question	2

Appendix 2: Faculty Publications, Presentations and Grant Applications

Ballenger

Publications:

Elmore, Michele[1]; Ballenger, Julie[2] and Harrison, Wade[1.] 2010. Exceptional Rarity and Carnivory: Characterizing Wetland Plant Communities in the Fall Line Sand Hills. [1]The Nature Conservancy, Georgia Chapter and [2]Columbus State University (extended abstract, requested by Longleaf Alliance)

Eklund, Lauren, J. Paul Simon, Julie Ballenger. 2009 High Performance Liquid Chromatography of the flavonolignans in commercial milk thistle supplements. Bios 80 (4) 164-169.

Presentations:

Ballenger, Julie, Michele Elmore . 2012. Rare Discoveries and Range Extensions of Endangered Wetland Plant Species. NALMS Southeastern Lake and Watershed Management Conference. Columbus, GA

Ballenger, Julie 2011. Columbus State University Departments of Biology, Chemistry and Earth and Space Sciences Gulf Coast CESU Membership presentation at the Joint CESU Regional Meeting. St. Petersburg FL.

Ballenger, Julie; Michele Elmore and Wade Harrison 2011. Characterization and conservation of wetland plant communities. Auburn University Biological Sciences Spring Seminar Series.

Elmore, Michele; Ballenger, Julie and Harrison, Wade 2010. Exceptional Rarity and Carnivory: Characterizing Wetland Plant Communities in the Fall Line Sand Hills. 8th Longleaf Alliance Conference, Charleston, SC

Ballenger, J.A. 2009. Characterization and Conservation of Wetland Plant Communities in the Georgia Fall Line Sand Hills. College of Health and Life Sciences, Fort Hays State University, Hays, Kansas

Ballenger, J.A. 2009 A Road Less Traveled: Incorporating International Field Experiences into a Biology Curriculum. Fort Hays State University, Hays, Kansas

Barone

Publications:

Swenson, N.G., P. Anglada-Cordero, and **J.A. Barone.** 2011. Deterministic tropical tree community turnover: evidence from patterns of functional beta diversity along an elevational gradient. Proceedings of the Royal Society B: 278:877-884

Laurance W.F. et al. (including me and 53 other authors). 2011. Global warming and the vulnerability of tropical biota: where do the thermal specialists live? Biological Conservation 144: 548-557.

Barone, J.A., J. Thomlinson, P.A. Cordero, and J.K. Zimmerman. 2008. Metacommunity structure of tropical forest along an elevation gradient in Puerto Rico. Journal of Tropical Ecology 24:1-10.

Barone, J.A., J.W. Beck, M.B. Potter, S.R. Sneed, K.E. Stephenson, and E.J. Dollar, II. 2008. Distribution of canebrakes in 19th century Alabama. Journal of the Alabama Academy of Science 79:1-11. (Co-authors are undergraduate students.)

Presentations:

May 2012 "Historical extent and ecology of southeastern prairies." J.A. Barone and K.G. Stephenson. Southeastern Prairie Symposium, Mississippi State University, Starkville, Mississippi.

Apr. 2012 "Metacommunity structure of Black Belt prairies." J.A. Barone and J.G. Hill. Association for Southeastern Biologists, Athens, Georgia.

Sept. 2011 "Metacommunity structure of blackland prairie communities in Mississippi and Alabama." J.A. Barone and J.G. Hill. Grasslands in a Global Context Symposium. Institute for Grassland Studies, Kansas State University, Manhattan, Kansas.

Apr. 2011 "Evaluation of prairie restoration techniques in Black Belt prairies of Mississippi." J.A. Barone, J.G. Hill & L. McInnis. Association for Southeastern Biologists, Huntsville, Alabama.

Apr. 2010 "Influence of individual, local and regional factors on tree hole abundance." J.A.Barone, L.W. Adams, A.C. Coan, M.J. Joiner, C.N. Rayford & K. S. Burgess. Association for Southeastern Biologists, Asheville, North Carolina.

Sep. 2009 "Distribution and ecology of southeastern prairies." Invited speaker. Auburn University, Auburn, Alabama.

Apr. 2009 "Inventory of remnant prairies along the Natchez Trace Parkway." J.A. Barone and J.G. Hill. Association for Southeastern Biologists, Birmingham, Alabama.

Oct. 2008 "Historical ecology and landscape ecology of southeastern prairies." Invited speaker. Georgia Southern University, Statesboro, Georgia.

Aug. 2008 "Extent and distribution of prairies in the southeastern United States in the 19th century." J.A. Barone and K.E. Stephenson. Ecological Society of America, Milwaukee, Wisconsin.

Grants:

External Support (includes major proposals)

2012 Not funded. Pre-proposal: Integrating DNA barcoding with field methods in the construction of pollination networks for prairie ecosystems. Co-PI. National Science Foundation.

2011 Not funded. Integrating DNA barcoding with field methods in the construction of pollination networks for prairie ecosystems. RUI. $599,947. Co-PI. National Science Foundation.

2011 Not funded. Biting and Stinging Pests: Ecology and Biological Control. Co-PI with R. Brown, J.G. Hill, L. McGinnis. U.S. Department of Agriculture.

2010 **Funded extension**. Restoration of Black Belt Prairie Remnants along the Natchez Trace Parkway. $5,000. With J.G. Hill, R. Brown, L. McGinnis. National Park Service.

2009 Not funded. Pollination networks in remnant prairie ecosystems of eastern North America. $450,000. Co-PI. National Science Foundation.

2008 **Funded.** Restoration of black belt prairie remnants along the Natchez Trace Parkway. $27,000. With J.G. Hill, R. Brown, L. McGinnis. National Park Service, U.S. Department of the Interior.

2008 **Funded**. Identification and delineation of prairie remnants along the Natchez Trace Parkway. $1500. With J.G. Hill. National Park Service, U.S. Department of the Interior.

Internal Support (Funded)

2012 CSU University Grant, $9945, to do DNA barcoding of prairie flora. Co-PI: K. Burgess.

2011 CSU Faculty Development Grant, $1100, to document and collect pollinators of blackland prairies for DNA barcoding.

2009 CSU Faculty Development Grant, $600, for equipment and supplies for biodiversity inventory of ant fauna at the Lynnhaven Wildlife Preserve.

2009 CSU Science, Technology, Engineering and Mathematics (STEM) Grant, $6000, to develop grant proposal on the use of DNA barcoding in constructing pollination webs. Co-PI: K. Burgess.

2008 CSU Faculty Development Grant, $393, to investigate the potential of restoring a bur oak preserve.

2008 CSU Faculty Development Grant, $1900, to establish a 1-hectare permanent vegetation plot at the Lynnhaven Wildlife Preserve for research and education. Co-PI: Kevin Burgess.

Publications:

2012 Galloway LF & Burgess KS (2012) Artificial selection on flowering time: Influence on reproductive phenology across natural light environments. *Journal of Ecology,* **100**: 852-861.

2011 Burgess KS, Fazekas AJ, Kesanakurti PR, Percy DM, Hajibabaei M, Graham SW, Husband BC, Newmaster SG, & Barrett SCH (2011) Discriminating plant species in a local temperate flora using the rbcL+matK DNA barcode. *Methods in Ecology and Evolution* **2**: 333-340.

2011 Kesanakurti PR, Fazekas AJ, Burgess KS, Percy DM, Hajibabaei M, Graham SW, Newmaster SG, Barrett SCH & Husband BC (2011) Spatial patterns of plant diversity below ground as revealed by DNA barcoding. *Molecular Ecology* **20**:1289–1302.

2009 Consortium for the Barcode of Life (CBOL) Plant Working Group: Hollingsworth PM, Forrest LL, Spouge JL, Hajibabaei M, Ratnasingham S, van der Bank M, Chase MW, Cowan RS, Erickson DL, Fazekas AJ, Graham SW, James KE, Kim K-J, Kress WJ, Schneider H, van AlphenStahl J, Barrett SCH, van den Berg C, Bogarin D, Burgess KS, Cameron KM, Carine M, Chacón J, Clark A, Clarkson JJ, Conrad F, Devey DS, Ford CS, Hedderson TAJ, Hollingsworth ML, Husband BC, Kelly LJ, Kesanakurti PR, Kim JS, Kim Y-D, Lahaye R, Lee H-L, Long DG, Madriñán S, Maurin O, Meusnier I, Newmaster SG, Park C-W, Percy DM, Petersen G, Richardson JE, Salazar GA, Savolainen V, Seberg O, Wilkinson MJ, Yi D-K, & Little DP. (2009) A DNA barcode for land plants. *Proceedings of the National Academy of Sciences* USA **106**: 12794-12797.

2009 Fazekas AJ, Burgess KS, Kesanakurti PR, Percy DM, Hajibabaei M, Graham SW, Husband BC, Newmaster SG & Barrett SCH (2009) Are plant species inherently harder to discriminate than animal species using DNA barcoding markers? *Molecular Ecology Resources* **9** S1:130-139.

2009 Galloway LF & Burgess KS (2009) Manipulation of flowering phenology: phenotypic correlations and maternal effects. *Ecology*, **90** (8), pp. 2139-2148.

2008 Fazekas AJ, Burgess KS, Kesanakurti PR, Percy DM, Hajibabaei M, Graham SW, Husband BC, Newmaster SG & Barrett SCH (2008) Multiple multilocus DNA barcodes from the plastid genome discriminate plant species equally well. *PLoS ONE* **3**:e2802.

2008 Burgess KS, Morgan M & Husband BC (2008) Inter-specific seed discounting and the fertility cost of hybridization in Red Mulberry (*Morus rubra* L.). *New Phytologist* **177** (1): 276-284.

Presentations:

2012 Botanical Society of America, Columbus, Ohio. Paris K, Boyd R, Burgess KS & Wright A.

2012 *Invited symposium speaker*: Association of Southeastern Biologists, University of Georgia, Athens, Georgia. Burgess KS.

2012 Association of Southeastern Biologists, University of Georgia, Athens, Georgia. Umoren D & Burgess KS.

2012 Association of Southeastern Biologists, University of Georgia, Athens, Georgia. Patel P & Burgess KS.

2012 Association of Southeastern Biologists, University of Georgia, Athens, Georgia. Mandiga H & Burgess KS.

2012 Association of Southeastern Biologists, University of Georgia, Athens, Georgia. Garcia A, Elmore M, Ballenger J, & Burgess KS.

2012 Association of Southeastern Biologists, University of Georgia, Athens, Georgia. Holly KS, Birkhead W, Moyer GR, & Burgess KS.

2012 Association of Southeastern Biologists, University of Georgia, Athens, Georgia. Caldwell C, Elmore, M, Ballenger J & Burgess KS.

2011 Fourth International Barcode of Life Conference, University of Adelaide, Adelaide, Australia. Graham SW, Kesanakurti PR, Fazekas AJ, Burgess KS, Barrett SCH, Hajibabaei M, Newmaster SG, Percy DM & Husband BC.

2011 Association of Southeastern Biologists, University of North Carolina, Ashville, North Carolina. Garcia A, Elmore M, Ballenger J & Burgess KS.

2010 Society for the Study of Evolution. Portland State University, Portland, Oregon. Burgess KS, Fazekas AJ, Kesanakurti PR, Graham SW, Hajibabaei M, Newmaster SG, Percy DM, Husband BC & Barrett SCH.

2010 Society for the Study of Evolution. Portland State University, Portland, Oregon. Shoemaker I & Burgess KS.

2010 Association of Southeastern Biologists. University of North Carolina, Asheville, North Carolina. Barone JA, Adams LW, Coan AC, Joiner MJ, Rayford CN & Burgess KS.

2010 Association of Southeastern Biologist, University of North Carolina, Asheville, North Carolina. Burden N & Burgess KS.

2009 Third International Barcode of Life Conference, Mexico City, Mexico. Kesanakurti PR, Fazekas AJ; Burgess KS; Barrett SCH; Graham SW, Hajibabaei M, Newmaster SG, Percy DM & Husband BC.

2009 The Biota-FAPESP International Symposium on DNA Barcoding, Sao Paolo, Brazil. Graham S, Kesanakurti PR, Fazekas AJ, Percy DM, Burgess KS, Saarela JM, Newmaster SG, Husband BC, Hajibabaei M & Barrett SCH.

2009 Society for the Study of Evolution, University of Idaho, Moscow, Idaho. Burgess KS, Fazekas AJ, Kesanakurti PR, Graham SW, Newmaster SG, Husband BC, Hajibabaei M, Percy DM & Barrett SCH.

2009 Society for the Study of Evolution, University of Idaho, Moscow, Idaho. Shoemaker I & Burgess KS.

2009 Association of Southeastern Biologist, University of Alabama – Birmingham, Alabama. Burgess KS, Fazekas AJ, Kesanakurti PR, Graham SW, Newmaster SG, Husband BC, Hajibabaei M, Percy DM & Barrett SCH.

2009 Association of Southeastern Biologist, University of Alabama Birmingham, Birmingham, Alabama. Thoman J & Burgess KS.

2008 Botanical Society of America, University of British Columbia, Vancouver, British Columbia. Galloway LF & Burgess KS.

2008 Society for the Study of Evolution, University of Minnesota, Minneapolis, Minnesota. Burgess KS, Fazekas AJ, Kesanakurti PR, Graham SW, Newmaster SG, Husband BC, Hajibabaei M, Percy DM & Barrett SCH.

2008 Society for the Study of Evolution, University of Minnesota, Minneapolis, Minnesota. Galloway LF & Burgess KS.

2008 Canadian Society for the Study of Evolution and Ecology, University of British Columbia, Vancouver, British Columbia. Fazekas AJ, Burgess KS, Kesanakurti PR, Graham SW, Newmaster SG, Husband BC, Hajibabaei M, Percy DM, & Barrett SCH.

2008 Canadian Society for the Study of Evolution and Ecology, University of British Columbia, Vancouver, British Columbia. Kesanakurti PR, Burgess KS, Fazekas AJ, Graham, SW, Newmaster SG, Husband BC, Hajibabaei M, Percy DM & Barrett SCH.

2008 The 2nd annual symposium of the Canadian Barcode of Life Network. Royal Ontario Museum, Toronto, Ontario. Barrett SCH, Husband BC, Newmaster SG, Graham SW, Fazekas AJ, Percy DM, Burgess KS, Kesanakurti PR, Hajibabaei M, J Gerrath J, Saarela JM.

2008 The 2nd annual symposium of the Canadian Barcode of Life Network. Royal Ontario Museum, Toronto, Ontario. Percy DM, Barrett SCH, Husband BC, Newmaster SG, Graham SW, Fazekas AJ, Burgess KS, Kesanakurti PR, Hajibabaei M, Gerrath J, Saarela

Grants:

2012 RUI – Pre-Proposal: Integrating DNA barcoding with field methods in the construction of pollination networks for prairie ecosystems. Burgess, KS (PI), Barone J (Co-PI), Newmaster SG (Co-PI). National Science Foundation: *$599,947– submitted Jan. 2012.*

2012 Dimensions: Collaborative Research: Functional pollination networks and the maintenance of species and genetic diversity. Brosi B (PI), Burgess KS (Co-PI), Armsworth P (Co-PI), and Dunne J (Co-PI). National Science Foundation Collaborative Proposal: Dimensions of Biodiversity: ~ *$2,000,000 (Burgess [CSU] $428,624) – submitted April 2012.*

2011 RUI: Integrating DNA barcoding with field methods in the construction of pollination networks for prairie ecosystems. Burgess, KS (PI), Barone J (Co-PI), Newmaster SG (Co-PI). National Science Foundation: *$599,947– submitted July 2011.*

2011 Dimensions: Collaborative Research: Functional pollination networks and the maintenance of species and genetic diversity. Brosi B (PI), Burgess KS (Co-PI), Armsworth P (Co-PI), and Dunne J (Co-PI). National Science Foundation Collaborative Proposal: Dimensions of Biodiversity: ~ *$2,000,000 (Burgess [CSU] $356,087) – submitted March 2011.*

2010 Functional pollination networks and the maintenance of species and genetic diversity. B. Brosi (PI), K. Burgess (Co-PI), P. Armsworth (Co-PI), and J. Dunne (Co-PI). National Science Foundation Collaborative Proposal: Dimensions of Biodiversity: ~ *$3,000,000 (Burgess [CSU] $585,786) – submitted June 2010.*

2010 Structure of Pollination Webs in Prairie Remnants: Analysis with DNA Barcoding. Burgess, KS (PI), Barone J (Co-PI), Newmaster SG (Co-PI). National Science Foundation: *$584,736 – submitted January 2010.*

2010 Genetic Analysis of Red Mulberry at Royal Botanical Gardens, Hamilton, Ontario, Canada. Kevin S. Burgess. Royal Botanical Gardens, Hamilton, Ontario, Canada: *$10,500 - funded.*

2010 Demographic and Genetic consequences of small population size in *Arabis georgiana* (Georgia Rockcress). Alicia Garcia, Michelle Elmore, Julie Ballenger and Kevin Burgess. Fish and Wildlife Service: *$5,000 – funded.*

2010 Demographic and Genetic consequences of small population size in *Arabis georgiana* (Georgia Rockcress). Alicia Garcia, Michelle Elmore, Julie Ballenger and Kevin Burgess. Georgia Native Plant Society: *$1,000 – funded.*

2009 Oxbow Barcoding Initiative. Kevin S. Burgess. STEM mini grant: *$10,000 – funded*.

Davis

Publications:

Kim, S.-H, C. Harzman, J. K. Davis, R. Hutcheson, J. B. Broderick, T. L. Marsh and J. M. Tiedje. 2012. Genome sequence of *Desulfitobacterium hafniense* DCB-2, a Gram-positive anaerobe capable of dehalogenation and metal reduction. BMC Microbiol. 12:21-41.

Grants:

2011 Awarded Faculty Equipment Grant (development grant of $2,185)

Frazier

Publications:

Nolan, P., Ross, J., Taylor, T., Mindingall, A., Redwood*, M., Frazier, M. C., Leggett-Robinson, P. (2008). Growth Inhibition of PC-3 cells by crude glucosinolates extracted from Brassica oleracea plants. *Journal of Undergraduate Chemistry , 4*, 113-117.

Presentations:

Parsi-Graciani, J. (Author), Frazier, M. C. (Presenter & Author), Annual Meeting of the Georgia Academy of Sciences, "The Effects of 17-Allylamino-demethoxygeldanamycin (17-AAG) On The Apoptotic Cell Signaling Pathways In PC-3 Cells," Georgia Academy of Sciences, Columbus State University. (March 27, 2010).

Frazier, M. C., (Presenter & Author), Hughes, K. S. (Presenter), CSU chapter of American Medical Student Association (AMSA), “Mercer University School of Medicine,” Columbus State University, Stanley 209A. (November 24, 2009).

Frazier, M. C. (Panelist member), National Association for Biology Teachers Conference, "Preparing undergraduates for college," NABT, Memphis, TN. (October 2008).

Redwood, M. (Presenter & Author), Frazier, M. C. (Presenter & Author), Taylor, T. (Author Only), Leggett-Robinson, P. (Author Only), 2008 AACR Annual Meeting, "Proliferation and viability studies of hibiscus sabdariffa, momordica charantia, and cabbage on PC-3 cells," AACR, San Diego, CA. (April 2008).

Grants:

Frazier, Monica C (Consultant/Mentor), "Effects of salinity stress on PVLEA3 gene sequencing in Phaseolus vulgaris," Abolanle Abikoye Columbus State University, $300.00. (February 2012 – May 2012).

Frazier, Monica C (Consultant/Mentor), "Effects of Effects of Bilberry Supplements on Immortalized Esophageal Cells," Marissa Naciuk Columbus State University, $300.00. (February 2012 – May 2012).

Frazier, Monica C (Consultant/Mentor), " Effects of Exercise on the Expression Levels of Matrix Metalloproteinase 23 in the supraspinatus tendons of Sprague Dawley Rats," Tony Nguyen Columbus State University, $300.00. (October 2010 – April 2011).

Frazier, Monica C (Principal), "Investigations of the Effects of DBM Nanotubes on Prostate Cancer Cell Growth," Columbus State University, $3,000.00. (April 2010 – May 2011).

Frazier, Monica C (Consultant/Mentor), "The Effects of 17-Allylamino-Demethoxygeldanamycin (17-AAG) on the Apoptotic Cell Signaling Pathways in LNCaP and PC-3 Cells," Columbus State University, $300.00. (February 2010 – May 2011).

Frazier, Monica C (Principal), "Impact Of Culinary Processes On The Anticarcinogenic Activity Of Cabbage Extracts," Sponsored by AICR, Federal, $140, 453.00. (2008).

Frazier, Monica C (Consultant), "Investigating the Effects of Isothiocyanate-Functionalized Carbon Nanomaterials as an Alternative and Complimentary Biochemical Therapeutic in Prostate Cancer," Sponsored by CDMRP- Congressionally Directed Medical Programs, Federal, $250,000.00. (2008).

Frazier, Monica C (Principal), Keller, Troy A (Co-Principal), Rugutt, Joseph K (Co-Principal), Motley, Milwood (Co-Principal), Sellers, Kathleen (Co-Principal), "URM: STudent Achievers in (STAR) program at Columbus State University (CSU)," Sponsored by NSF, Federal, Pre-Proposal - $0.00. (2008).

Hendricks

Presentations:

Hendricks, M.B. and H.J. Hendricks. 2010. The use of rubrics for promoting and evaluating student learning. Eighth Annual Interdisciplinary Conference for Teachers of Undergraduates. Barnesville, Georgia. A collaborative work with faculty from College of Education.

Hendricks, M.B, T. Butcher, and H.J. Hendricks. 2008. Utilizing various learning styles to improve student learning across disciplines. Sixth Annual Interdisciplinary Conference for Teachers of Undergraduates. Barnesville, Georgia. A collaborative work with faculty from College of Education and Center for Academic Advising using the science classroom as a model.

Hughes

Publications:

Hughes KS. Research on Learning: Peer-Assisted Learning Strategies in Human Anatomy and Physiology. *The American Biology Teacher*. Vol. 73, No. 3 (March 2011), pp. 144-147.

Presentations:

Hughes, Kathleen. "Perspective in Cross-Year Peer-Assisted Learning." 2009 West Central Georgia Regional STEM Institute. Columbus, GA.

Sellers, Kathleen. "Study Abroad in the Bahamas: Understanding Contemporary Health Issues through Service Learning." 2008 Georgia Consortium for International Studies symposium, Georgia Perimeter College, Clarkston Campus. *

Sellers, LaRue George, Ware Shoals HS, West Shoals, SC, and **Sellers, Kathleen**, Columbus State University, Columbus, GA. "The Transition from High School to College Biology." 2008 National Association of Biology Teachers, Memphis, TN. *

Grants:

2012 University Grant, Office of the Provost, "Role of Estrogens in Astrocyte Viability", $2,267.19 awarded for Spring/Summer

2012 Quality Enhancement Grant, "Science Writing in BIOL 5515 Neuroscience: Creating a Journal Article", CSU, $2000 awarded.

2010 Faculty Development Grant, "Role of Estrogens in Intestinal Epithelial Protein Expression: Implications for Celiac Disease Prevention and Control", CSU, $4238 awarded for Summer/Fall

2009 Facilitator and Panelist, West Central Georgia Regional STEM Institute, Columbus, GA
2009 Faculty Development Grant, "Implementing Cross-Year Peer-Assisted Learning in BIOL 2221", CSU Science, Technology, Engineering, and Mathematics (STEM) Initiative, $5015 awarded for Spring 2009 BIOL 2221.

Klar

Presentations:

2012 Presented Workshop at the Georgia Society for Histotechnology 2012 Symposium at Callaway Gardens in Pine Mountain, Ga. The title of the workshop was "Human Tissues: Histological Identification of the Different Types".

Schwartz

Publications:

2011 Co-author/editor of a Learning Curve question sets for *Genetics: A Conceptual Approach 4e* (2011) – Wrote questions for 7 out of 26 chapters. These questions have been incorporated into Learning Curve, which is an online quiz/tutorial textbook supplement. The questions included hints for students and specific feedback for both correct and incorrect responses.

2011 Co-author/editor of a test bank for *Essential Genetics* by Benjamin Pierce (2011) – Reviewed, edited, and wrote new questions for 9 out of 17 chapters of this widely used textbook.

2010 Co-author/editor of a test bank for *Genetics: A Conceptual Approach 4e* by Benjamin Pierce (2010) – Reviewed, edited, and wrote new questions

Presentations:

Lauren A. Neill* and Brian W. Schwartz. 2012. GENETIC AND PHYSIOLOGICAL CHARACTERIZATION OF COPPER UTILIZATION MUTANTS IN *SACCHAROMYCES CEREVISIAE*. Georgia Academy of Science. Abstract accepted.

Brian W. Schwartz, R. Chris Moore, and Jodi L. Bosanko. 2011. ASSESSMENT OF THE ECOLOGICAL SIGNIFICANCE OF A MALE-INDUCING PHEROMONE IN THE FERN *CERATOPTERIS RICHARDI*. Georgia Academy of Science.

Schwartz, Brian W. 2008. COLLABORATIVE WRITING IN BIOLOGY FOR A REAL AUDIENCE. National Association of Biology Teachers Annual Meeting.

Zuiderveen

Publications:

2012 Bringolf, R., Jennings, C and Zuiderveen, J. 2012. "Assessment of Endocrine Disruption in Fish and Estrogenic Potency of Waters in Georgia". Report submitted to Georgia Water Resources Institute, Atlanta, GA.

Presentations:

2011 Using 'Discussions' to Increase Student Connections, Cognitive Learning and Critical Thinking. Platform presentation. Second Annual Distance Learning Conference, September 29-30, 2011. Columbus State University, Columbus, GA.

2010 Mussel Surveys of the Chattahoochee River, GA and Implications about Water Quality. Poster presentation. Annual Meeting of the Society of Environmental Toxicology and Chemistry, November 8, 2010. Portland, OR

Grants:

2011 "Assessment of Endocrine Disruption in Fish and Estrogenic Potency of Waters in Georgia". 2011. Co-PI with Robert Bringolf (UGA) and Cecil Jennings (USGS). My part was to sample fish, collecting blood and reproductive organs, and water at sites on the Chattahoochee and Flint Rivers. Selected for funding by Georgia Water Resources Institute (GWRI). $20,000.

Birkhead (Emeritus)

Publications:

Birkhead, W.S., and G.E. Stanton. 2011. Columbus State University's approach to undergraduate research. CUR Quarterly 32:20-22.

Birkhead, W.S., and M. Jurgensen. 2008. An assessment of the Weracoba offline remediation facility using fishes as biological indicators. Report to WWETCO, LLC. 8 p.

Birkhead, W.S. 2008. A survey of alligators inhabiting the Eufaula National Wildlife Refuge, with emphasis on the Chattahoochee River, Cowickee Creek, Wylaunee Creek, and their associated marshes, Barbour County, Alabama, and Stewart County, Georgia. Report to the U.S. Fish and Wildlife Service, Eufaula National Wildlife Refuge. 7 p.

Birkhead, W.S., A. Holley, M. Winstead, and M. Jurgensen. 2009. Mitigating urban runoffs in a tributary of Roaring Branch, Columbus, Muscogee County, Georgia: An assessment based on ichthyological surveys. Report to WWETCO, LLC. 7 p.

Birkhead, W.S., and D. Walker. 2009. A survey of alligators inhabiting the Eufaula National Wildlife Refuge, during the spring and summer 2009, with emphasis on the Chattahoochee River, Cowickee Creek, Wylaunee Creek, and their associated marshes, Barbour County, Alabama, and Stewart County, Georgia. Report to the U.S. Fish and Wildlife Service, Eufaula National Wildlife Refuge. 6 p.

Birkhead, W.S. 2010. Occurrence of the Alligator Snapping Turtle, Macrochelys temminckii, Barbour's Map Turtle, Graptemys barbouri, and the Bluestripe Shiner, Cyprinella callitaenia, in the vicinity of the confluence of Upatoi Creek and the Chattahoochee River. Report to J.A. Carter and Associates.

Birkhead, W.S., and K. Holley. 2011. An ichthyological survey of the Chattahoochee River between Dillingham Bridge and North Highlands Dam conducted in association with a Chattahoochee restoration project, Columbus, Muscogee County, Georgia. Report to CH2M HILL. 12 p.

Birkhead, W.S., and K. Holley. 2011. An ichthyological survey of the Chattahoochee River between Dillingham Bridge and North Highlands Dam conducted in association with a Chattahoochee River restoration project. Second Revised Report. 9 p.

Birkhead, W.S., and D. Walker. 2011. Size distribution and habitat preference of alligators spotlighted at four locations on the Eufaula National Wildlife Refuge, Barbour County, Alabama, and Stewart County, Georgia, in late May, late June, and early August Report to the U.S. Fish and Wildlife Service, Eufaula National Wildlife Refuge. 5 p.

Stanton (Emeritus)

Publications:

- Brian S. Helms, Chester Figiel, John Rivera, Jim Stoeckel, **George Stanton**, Troy Keller. (accepted by SEB, July **2012**). Life history observations, environmental associations, and soil preferences of the Piedmont Blue Burrower (Cambarus (Depressicambarus) harti) Hobbs
- JoAnn Chadwick and **George E. Stanton**. **2011**. Habitat Characteristics and Conservation Status of Three Pennides Crayfish in Marion County, Georgia. Southeastern Naturalist: 10, pages 533-546.
- William S. Birkhead and **George E. Stanton (2011)** Columbus State UniversityColumbus State University's Approach to Undergraduate Research in Biology. CUR Quarterly. 32(1): pages 20-22

Appendix 3 Current Workload and courses taught.

Course (S=service, R=required)	# section/fall+spring	contact hours	add 5th yr MS/MS program	Notes
Biol 1125 (s)	4	12* (2 large + 2 small lectures)	no change or reduce	reduce or only offer in summer
Biol 1215 (s/r)	36 (6 lectures)	18* (need grad students in labs)	no change or reduce	lab coordinator + 6 grads
Biol 1216 (s)	1 section in spring	5	no change	
Biol 1225 (s/r)	6	24	no change	
Biol 2221 (s)	10	6* lecture + 10 2hr labs=26	no change or reduce	reduce to address needs
Biol 2222 (s)	6	6 lecture + 6 2hr labs=18	no change or reduce	reduce to address needs
Biol 2225 (s)	8	6 lecture + 8 2hr labs=22	no change or reduce	reduce to address needs
Biol 2285 (r)	2	6	no change	
Biol 3215 (r)	4	6 lecture + 4 3hr labs=18	no change	
Biol 3216 (r)	4	6 lecture + 4 3hr labs=18	no change	
Biol 3217 (r)	3	6 lecture + 3 4hr labs = 18	no change	
Biol 3218 (r)	3	6 lecture + 3 3hr labs=15	no change	
Biol 4391 (r)	0.33x1hrx~2student	0.66	no change	
Biol 4392 (r)	0.33x2hrx~2=student	1.32	no change	
Biol 4393 (r)	0.33x2hrx~2student	1.32	no change	
Biiol 4698(internship) (r)	0.5x4hrx~2student	4	no change	
Biol 4795 (r)	4	12	no change	
Biol 5515 (r)	4	8 hr lecture + 4 3hr labs=20	add 1 sec/yr=25	
Biol 5525 (r)	4	8 hr lecture + 4 4hr labs=24	add 2 sec/yr=36	
Biol 5535 (r)	4	8 hr lecture + 4 4hr labs=24	add 2 sec/yr=36	
ENVS 1105 (s)	2	6	no change or reduce	reduce to address needs
ITDS (s/r)	2	2	no change or reduce	reduce to address needs
ISCI (s)	2	8 taught by part time	no change	
		303.3 (+72 hrs grad students)	add 29 hrs + other classes	
Current faculty loads		**Goal**	**Need/Options**	
Ballenger=12		Ballenger=12	Lecturer	
Barone=18		Barone=18	Klar off lab fees	
Burgess=24		Burgess=18	Additional faculty	
Davis=24		Davis=18	Additional grad students	
Frazier=24		Frazier=18	Reduce # service classes	
Hendricks=24		Hendricks=18		
Hughes=24		Hughes=18		
Klar=30		Klar=30		
Motley=24		Motley=18		
Newbrey=24		Newbrey=18		
Ruehl=24		Ruehl=18		
Schwartz=18		Schwartz=18		
Stokes=24		Stokes=18		
Zuiderveen=24		Zuiderveen=18		
Total=318-24=294		Total=247+***lecturer(30hr)*** =277		
faculty/yr w/ reduced loads=24hr reduction		303.3-277-8part time=18.3hrs		
3-294=9.3hrs covered by part time		18.3hrs covered by PT or grad		
		Require-lecturer		

On average eight faculty per year teach large lecture sections (120-168 students) and are given a one course load reduction during that semester. Faculty member loads indicate a total of 318 possible contact hours, however with eight faculty garnering a 3 contact hour reduction that number is reduced by 24 (318-24=294 contact hours generated with our current staff). We have a part time faculty member teaching an integrated science class (ISCI 2001 Earth and Life Science), a course mandated by the state to be taught in discipline, as well as 6 graduate students teaching the 18 lab sections of Principles of Biology. In this manner we cover the course needed by our majors as well as serve the core science needs for the university. Faculty course load reductions are rotated so no single individual has a reduced teaching load all year. To move forward with our current program and add an MS we need:

1. The addition of a lecturer would move us in the direction of a 9+9 work load, a more reasonable teaching load with research and mentoring demands.
2. Provide a state funded line for Klar (a critically valuable member of our program) and free lab fees to pay graduate student stipends.
3. Hire an additional faculty member to sustain growth in our undergraduate program and increase the diversity of expertise in our future graduate program.

Appendix 4. Biology Review Data prepared by the Social Research Center

All biology courses (N=1995)

Course Evaluation Questions

1. The instructor is well prepared.
2. The instructor effectively conveys the content area.
3. The instructor clearly communicates all assignments including tests and papers.
4. The instructor promotes a class environment conducive to learning.
5. The instructor encourages questions.
6. The instructor promotes an academic environment in which all are treated with respect.
7. Overall the instructor is effective.
8. I have progressed in my ability to think critically, to solve problems, and/or to make decisions.
9. This course was academically challenging.
10. I can articulate core concepts or content of this course.

1000 level biology courses (N=1005)

Course Evaluation Questions

1. The instructor is well prepared.
2. The instructor effectively conveys the content area.
3. The instructor clearly communicates all assignments including tests and papers.
4. The instructor promotes a class environment conducive to learning.
5. The instructor encourages questions.
6. The instructor promotes an academic environment in which all are treated with respect.
7. Overall the instructor is effective.
8. I have progressed in my ability to think critically, to solve problems, and/or to make decisions.
9. This course was academically challenging.
10. I can articulate core concepts or content of this course.

2000 level biology courses (N=632)

Course Evaluation Questions

1. The instructor is well prepared.
2. The instructor effectively conveys the content area.
3. The instructor clearly communicates all assignments including tests and papers.
4. The instructor promotes a class environment conducive to learning.
5. The instructor encourages questions.
6. The instructor promotes an academic environment in which all are treated with respect.
7. Overall the instructor is effective.
8. I have progressed in my ability to think critically, to solve problems, and/or to make decisions.
9. This course was academically challenging.
10. I can articulate core concepts or content of this course.

3000 level biology courses (N=219)

Course Evaluation Questions

1. The instructor is well prepared.
2. The instructor effectively conveys the content area.
3. The instructor clearly communicates all assignments including tests and papers.
4. The instructor promotes a class environment conducive to learning.
5. The instructor encourages questions.

6. The instructor promotes an academic environment in which all are treated with respect.
7. Overall the instructor is effective.
8. I have progressed in my ability to think critically, to solve problems, and/or to make decisions.
9. This course was academically challenging.
10. I can articulate core concepts or content of this course.

4000-5000 level biology courses (N=139)

Course Evaluation Questions

1. The instructor is well prepared.
2. The instructor effectively conveys the content area.
3. The instructor clearly communicates all assignments including tests and papers.
4. The instructor promotes a class environment conducive to learning.
5. The instructor encourages questions.
6. The instructor promotes an academic environment in which all are treated with respect.
7. Overall the instructor is effective.
8. I have progressed in my ability to think critically, to solve problems, and/or to make decisions.
9. This course was academically challenging.
10. I can articulate core concepts or content of this course.

Mean	Standard Deviation	Median	Minimum	Maximum
4.65	0.68	5	1	5
4.31	1.01	5	1	5
4.43	0.96	5	1	5
4.47	0.89	5	1	5
4.42	0.93	5	1	5
4.58	0.83	5	1	5
4.29	1.06	5	1	5
4.02	1.13	4	1	5
4.47	0.85	5	1	5
4.11	1.09	4	1	5

Avg=4.38

Mean	Standard Deviation	Median	Minimum	Maximum
4.57	0.74	5	1	5
4.09	1.14	5	1	5
4.25	1.08	5	1	5
4.29	1.02	5	1	5
4.2	1.07	5	1	5
4.44	0.94	5	1	5
4.04	1.21	5	1	5
3.75	1.24	4	1	5
4.3	0.93	5	1	5
3.89	1.23	4	1	5

Avg=4.18

Mean	Standard Deviation	Median	Minimum	Maximum
4.81	0.47	5	2	5
4.63	0.71	5	1	5
4.68	0.71	5	1	5
4.68	0.67	5	1	5
4.67	0.65	5	1	5
4.76	0.6	5	1	5
4.59	0.77	5	1	5
4.3	0.94	5	1	5
4.66	0.75	5	1	5
4.35	0.87	5	1	5

Avg=4.61

Mean	Standard Deviation	Median	Minimum	Maximum
4.58	0.76	5	1	5
4.34	0.91	5	1	5
4.47	0.91	5	1	5
4.54	0.76	5	1	5
4.52	0.8	5	1	5

4.56	0.86	5	1	5
4.38	0.9	5	1	5
4.21	0.93	4	1	5
4.67	0.64	5	1	5
4.23	0.98	4.5	1	5

Avg=4.45

Mean	Standard Deviation	Median	Minimum	Maximum
4.61	0.76	5	1	5
4.49	0.81	5	1	5
4.53	0.8	5	1	5
4.65	0.72	5	1	5
4.72	0.64	5	1	5
4.73	0.71	5	1	5
4.56	0.77	5	1	5
4.48	0.78	5	1	5
4.55	0.75	5	1	5
4.49	0.73	5	1	5

Avg=4.58

Columbus State University, Department of Biology
Peer Review of Teaching Checklist

Instructor Observed: _____ Course: _____

Peer Reviewer: _____ Date: _____

Consider each teaching element below and evaluate the teaching skills of the instructor you are observing. At the end of the checklist, provide a summary of the lecture, as well as a summary of the instructor's strengths and any suggestions you have for improvement.

Scale: 1 = Most effective, 4 = Least effective, NA = Not applicable

Class Organization	1	2	3	4	NA
The instructor:					
1. Started and ended class on time.					
2. Introduced lecture topics at the start of class (overview or focusing activity).					
3. Paced topics appropriately.					
4. Allowed sufficient time for note taking.					
5. Sequenced topics logically.					
6. Related topics to previous or future lectures.					
7. Summarized or reviewed major concepts.					
Comments:					

Presentation	1	2	3	4	NA
The instructor:					
8. Maintained eye contact with students.					
9. Used appropriate voice volume and inflection.					
10. Spoke clearly and at an appropriate speed.					
11. Presented or explained content clearly.					
12. Defined unfamiliar terms, concepts, and principles.					
13. Used good examples to clarify points.					
14. Varied explanations to respond to student questions or needs for clarification.					
15. Emphasized important points.					
16. Used graphics or visual aids or other enhancements to support presentation.					
17. Presented information or led discussions with enthusiasm and interest.					
18. Responded appropriately to student behaviors indicating boredom or confusion.					
19. Used appropriate humor and/or demonstrated current applicability of topics to strengthen retention and interest.					
Comments:					

Class Interactions	1	2	3	4	NA
The instructor:					
20. Maintained student attention.					
21. Encouraged student questions.					
22. Restated questions and answers when necessary.					
23. Gave satisfactory answers to student questions.					
24. Asked questions to monitor student understanding.					
25. Provided opportunities for students to interact together to discover/discuss or practice content points.					
Comments:					

Mastery of Content	1	2	3	4	NA
The instructor:					
26. Presented content at an appropriate level for the students.					
27. Presented material relevant to the purpose of the course.					
28. Demonstrated command of the subject matter.					
Comments:					

Instructor Attitudes	1	2	3	4	NA
The instructor:					
29. Showed enthusiasm for the content.					
30. Showed respect for student questions and answers.					
Comments:					

Please provide a brief summary of the lecture that you observed (use the back of form if needed).

What were the instructor's major strengths, as demonstrated in this observation?

Do you have any suggestions for improvement?

Appendix 6 – Biology Student Senior Research Presentations

Below is a list of 85 research projects completed in the last five years. Students that presented their research projects at regional or state meetings are designated with an asterisk, those that won awards for their research are listed under II E. Quality of Faculty and Student Achievement.

Khaliyah Abikoye - Salinity Stress Tolerance in Phaseolus K.

Ifeoma Akuta - Effects of Brilliant Blue G and Methylprednisolone Acetate on Astrocytes.

***Neena Alex** - The Effect of 17β Estradiol on Angiotensin II Production in Astrocytes under Oxidative Stress.

Jasmine Bailey - The role of Adiponectin and Leptin on cell viability in cultured rat insulinoma beta cells.

***Ricky Batts** - Burrow Usage by Gopher Tortoises, *Gopherus polyphemus*, within a Metapopulation in Marion County, Georgia.

Nakita Benson - Box turtle fidelity.

Shanna Bolcen - Estimating Plasmid Sizes of Multi-Drug Resistant *Salmonella* Heidelberg.

***Linda Bomboka** - Effects of Calcium on Myoblasts Exposed to Hypoxia.

Will Borin - The Effects of Bacteria on Germination of Clover.

***Contessa Bowman** - The Effectiveness of Prophylactic Eye Drops on the Reversal of UV Light-Induced Cataracts.

Carmen Bradshaw - *Methylobacterium* spp. Influence on Tissue Development in Plants.

Patronya Brogdon - The effects of rhizobial inoculum on plant growth.

***Rae Bucher** - Nitrate phytoremediation using Gempler's test kits.

***Nakita Burden** - Discriminating Cultivated *Rhododendron* taxa Using DNA Barcodes.

***Cristina Caldwell** - The IBI (index of biotic integrity) of Hannahatchee Creek.

Patricia Campbell - Efficacy of the rbcL+matK barcode in the taxonomically complex groups of Rhododendron.

Kirstin Carros - Variable Effects on Competition between *Streptococcus mutans* and *S. sanguis*.

Nicole Carver - An Assessment of the Water Quality of Hannahatchee Creek Using Fish as Biological Indicators.

Kevin Cogdell - The Effects of Cadmium on the Movement of Asian Clams.

Christina Cox - The Relative Abundance and Distribution of Mesopredators in the Callaway Preserve.

Blake Duvall - Bacterial Diversity in the Water within the Pitchers of *Sarracenia leucophylla* and *S. purpurea* at the Same Location

Amanda Eddins - Effect of Thyroid Hormones on AT1R mRNA Levels in HEK 293 Cells.

Bailee Farmer - Toxicity of *Latrodectus geometricus* (brown widow) spiders.

Olumuyiwa Fatada - Detection of gliotoxin.

Anna-Maria Giacobello - A Scent-Station Survey of Medium-Size Mammals on the Callaway Preserve, Harris County, Georgia.

***Meredith Gilbert** - Effect of Increased Carbon Dioxide on Urushiol Production in *Toxicodendron radicans.*

Matthew Goodson - Seed Banks of *Arabis georgiana* at Goat Rock Park.

Akeeta Harris - The detection of Hg2+ with functional DNA and gold nanoparticles.

Stewart Helton - Male interactions of *Ceratopteris richardii* during sexual conversion.

Giana Herndon - The Effect of Temperature and Light on the Senescence of Water Hyacinth.

***Amanda Holley** - Mitigating Urban Runoff - Determination of the Effects of a Retention Pond on a Tributary of Roaring Branch Creek, Muscogee County, Georgia.

***Kimberly Holley** - Determining the Possible Fish Host for *Alasmidonta triangulata*, an Endangered Mollusk Endemic in the ACF Basin.

Henry Hutcheson - Food Habits of Redbreast Sunfish, *Lepomis auritus*, and Bluegill*, L. macrochirus*, in Lindsey Creek, Columbus, Muscogee County, Georgia.

Ciara Jenkins - Effects of Sinigrin and Allyl Isothiocyanate on PC-3 Cells.

Michael Joiner - Gram-negative Flora of the Surface Mucus Layer of the Bluegill, *Lepomis macrochirus*.

Megan Kirksey - Selection of Physical Components of the Habitat by *Pteronotropis grandipimis*, the Apalachee Shiner.

Jordan Knoefler - Gliotoxin Production in *Candida* Species.

Nina Kuei - Elastace and Phospholipase Activity in Clinical and Environmental Isolates of *Aspergillus fumigatus*.

***Terry Langfitt** - SAP Genes in *Candida.*

Adriana Levesque - Effects of Caffeine on Heparin-binding Epidermal Growth Factor and Fibroblast Growth Factor – 2 in Human Embryonic Cells.

Sara Lindsey - The effects of curcumin on colon cancer cells.

Bliss Lucas - The Effects of Curcumin on the Growth and Viability of Human Colon Carcinoma.

Lakeshia Mallard - Chinese Privet and its suppression in native species.

***Hemalata Mandiga** - Evaluating the Efficacy of Indian Herbal Medicines on Cancer Cells and Confirming Their Genetic Identity Using DNA Barcoding.

Charita Marthone - Effect of Caffeine and Withdrawal on Memory and Physical Metabolism in Rats.

Melissa Mills - The Effect of Eicosapentanoic Acid on Endothelial Nitric Oxide Synthase Expression in Endothelial Cells.

Eli Mitcham - Bacterial Diversity in the Water within the Pitchers of *Sarracenia rubra* in Different Localities.

Brittini Mitchell - Effect of Simulated Domatia on Mite Density.

Chris Moore - Effect of Distance between Gametophytes on Cross-fertilization in C-ferns.

Susan Musyimi - Gliotoxin Production in *Aspergillus fumigatus*.

Marisa Naciuk - Effects of Bilberry Supplement on Immortalized Esophageal Cells.

John Neill - Efficacy of Cartilage Supplements in Stimulating Chondrogenesis

***Lauren Neill** - Genetic Analysis of *Saccaromyces cerevisiae* Copper Mutants.

Melissa Nestor - Effect of Garlic on Methicillin-resistant *Staphylococcus aureus.*

Samantha Nieves - Effects of Combined Extracts on Cell Viability and Proliferation of Ovarian Cancer Cells.

Adam Nguyen - Effects of Metal Mixtures on the 17 E/S DNAzyme Biosensor.

***Parag Patel** - DNA Barcoding of Indian Herbal Medicines and Testing Their Effects on Cancer Cell Lines.

***Roma Patel** - Potential cytotoxicity of colored orthodontic latex bands to human fibroblast cells.

***Josheph Parsi-Graciani** – The Effects of 17-Allylamino-Demethoxygeldanamycin (17-AAG) on the Apoptotic Cell Signaling Pathways of PC-3 Cells

Anthony Peters - Characterization and Attempted Functional Complementation of a Copper Mutant in *Saccharomyces cerevisiae.*

Clarence Powell - Effect of coenzyme Q on myoblast viability.

Ashley Purvis - The Effect of Nickel and Zinc on a Gerontogene Mutant of *Caenorhabditis elegans*.

Courtney Rayford - Effects of Isothiocyanate Extracts on Prostate Cancer.

Melissa Redwood - Proliferation and Viability Studies of *Hibiscus sabdariffa* and *Momordica charantia* on PC – 3 Cells.

John Rivera - Crayfish burrowing activity.

Janay Ross - Analyzing copper metabolism mutants of *Saccharomyces cerevisiae* for reverse mutation and intergenetic suppression.

***Amy Schabel** - Classification of Seasonal Bacterial Populations Growing in a *Sarracenia rubra* Pitcher.

Tyree Sharpe - Dietary composition and foraging efficiency of rural and urban squirrels

***Jennifer Silvers** - Effects of Natural Anti-inflammatory Agent on TLR4 Expression-Implication for Lyme Neuroborreliosis.

Deyka Smith - A Gopher Tortoise (*Gopherus polyphemus*) Burrow Survey on the Kimbrel Tract, Miller County, Georgia, to Determine Changesin the Population Size of an Isolated Group of Tortoises Between 1997 and 2007.

Jerry Sojan - Role of Renin – Angiotension System in Nitric Oxide Production in Neurons.

Stephanie Sponseller - Antiviral Activity of Beta-Defensins 1 and 2 on Herpes Simplex Virus Type 1.

Shawntay Staley - Development of zebra fish in urban creeks compared to rural creeks.

Jacqueline Todd - Relative Abundance and Distribution of Meso-Predators at the Callaway Preserve, Harris County, Georgia.

Shannon Tyler - Efficacy of Equine Rotational Deworming in Southeastern United States.

***Daniel Umoren** - Ethnobotanical Genomic of Medicinal Plants in Nigeria.

***Eunice Yu** - Neuroprotective Effects of 17 – B Estradiol in the Brain: Role of Astrocytes?

Fabian Vazquez - Effects of Monster Energy Drinks© on Glutamate Release in the Neuromuscular Junction of Nerve 3 of *Procambarus clarkii* and *P. zonangulus*

***Nylvia Ware** - Antiviral Effect of Lactoferrin on Herpes Simplex Virus Type 1.

James Webster - Copper-utilization Mutants of Yeast.

Brittany Whiters - Effect of Amphiphysin Antibodies on $GABA_B$ Receptors in Glial Cell Cultures and its Influence on Stiff Person Syndrome.

Beverly Whitt - The Effectiveness of an Artificial Caudal Spot in Avoidance of Predation.

Rob Willingham - Evaluation of Procedures for Isolating Environmental Mycobacteria.

Michael Winstead - Mitigating Urban Runoff: Establishment of Baseline Conditions and a Determination of a Relationship Between Stream Conditions and Urbanization.

Emily Wraggs - The Effect of Cadmium on Gerontogene Mutants of *C. elegans*.

Appendix 7: Biology Department Faculty Service

Ballenger

University—Institutional Committees & Service

2008-present Sustainability Committee
2006-present Admissions Policy Committee
2002-present International Education
- 2010-present Service and Internship subcommittee
- 2009-2010 Study Abroad Program Review subcommittee
- 2008-2009 Study Abroad Scholarship Committee (Chair)
- 2008-2010 Campus Internationalization Strategic Plan
- 2006-2008 Study Abroad subcommittee (Chair)

College of Science, Department of Biology

2010 – present Biology Academic Advisory Committee
2010 - present CSU Chair Advisory Committee
2006-2010 mentor Dr. Kathleen Hughes and Dr. Kevin Burgess
1995-present Beta Beta Beta (2003-present National Advisor)
1995-present Herbarium Curator (part of regional review by Wendy Zomlefer – UGA)

Community Service

2011 **Harris County High School Biology Club** – Research and international educational opportunities at CSU Biology Department
2009 **Characterization and Conservation of Wetland Plant Communities in the Georgia Fall Line Sand Hills** - Lynn Haven Botanical Club
2009, 2011 **Columbus Master Gardener Program** – taught basic botany and plant physiology courses
2009 **Brookstone High School** – produced map and trail guide for trees and shrubs of Roaring Branch Campus, Faust Trail
2009 **Habitat for Humanity** volunteer
2006-2012 **Ledger Enquirer Page One Judge** – select outstanding educator from the region

Professional Service Community Based

2008 – present **Chattahoochee-Chipola Clean Water Partnership** – steering committee member representing CSU
2008 - present **Alabama Clean Water Partnership –** elected member representing CSU
2008 **Middle Chattahoochee Water Coalition** – elected member representing CSU
2008 **Georgia Department of Education** – served as part of three person team, wrote and developed Georgia High School Performance Standards for teaching Botany

Other Service to the COS and Department of Biology

2009-10 **Science Olympiad** – appeals committee
2008-12 Met with **CSU recruiters**, toured Biology labs, highlighted student research and international programs
2008 **Lindsey Creek Walking Trail** – surveyed trail for endangered plants, approved paper work to allow planned development

Search Committees

- 2009 Dean, College of Letters and Science
- 2008 Director, Oxbow Meadows Environmental Learning Center

Barone

University—Institutional Committees & Service

2011-2012 Member, Publications Committee
2010 Attended McAllister and Quinn National Science Foundation Workshop
2009-2011 Chair, Quality Enhancement Program—Writing Across the Curriculum Committee
2009 Attended Curriculum Development and Teaching Enhancement Conference of University System of Georgia
2009-2011 Chair, Quality Enhancement Program—Grants Subcommittee
2009-2011 Chair, Quality Enhancement Program—Fellows Subcommittee
2008-2009 Member, Quality Enhancement Program Committee
2008 Member, Master Plan Committee
2006-2009 Chair, Administrative Technology Utilization Committee
2005-2009 Member, Developments and Improvements Committee
2005-2008 Member, International Education, Latin American Subcommittee

College Committees & Service

2010-2011 Member, Post-tenure Review Committee
2009 Member, College Personnel Committee
2008-2010 Member, Environmental Science Program Advisory Committee
2004-2008 Member, College Curriculum Committee

Departmental Committees & Service

2011-2012 Member, Freshwater Zoologist Search Committee

2010-2011 Chair, Vertebrate Ecologist Search Committee
2010-present International Travel Coordinator
2010-2011 Member, Biology Department Graduate Program Committee
2009-present Member, Departmental Personnel Committee (Chair in 2009)
2008 Chair, Department Equipment Needs Committee

Community Service

2004-2008 Served as judge/scorer for Science Olympiad
2006,07,12 Judge, Muscogee County Science Fair

Burgess

University Committees:

2010 Search Committee: Associate Provost for Graduate Education, Research and Economic Development
2009 Search Committee – Associate VPAA

College of Letters and Science:

2011-12 ENVS Graduate Program Committee
2009-10 Grants committee
2008 Chair of the College of Science grants sub-committee

Department of Biology:

2011-12 Building Space committee
2009-12 Chair of Biology Graduate Program committee
2012 Search committee: Freshwater Biologist
2010-11 Search committee: Vertebrate Ecologist
2009 Search committee: Chair of Biology Department
2009 Search committee: Lab coordinator position
2009-10 Chair of "spend-out" committee
2008 Biology Department Purchasing Committee

Other Service to the Department of Biology and COLS:

2012 Herbarium: Curator
2009-12 Herbarium: Assistant Curator
2011 Organized Conservation Biology Symposium: CSU Graduate Student Conference
2011 ENVS presentation "Plant DNA Barcoding"
2009 Herbarium: coordinated the donation of 12 herbarium cabinets to the herbarium
2008-10 Georgia Regional Science Olympiad: Trajectory event coordinator

Outreach and Public Service (selected 2008 - present):

2011 Nature interpretation: Mulberry Creek Elementary School
2010 Science Olympiad – Event Supervisor
2010 Oxbow Meadows Environmental Learning Center
2009 Science Fair – Columbus High school
2009 Lynn Haven Garden Club
2009 Oxbow Meadows Environmental Learning Center
2009 Science Olympiad – Event Supervisor
2008 Science Olympiad – Event Supervisor
2008 Nature interpretation: Mulberry Creek Elementary School

Media (selected 2008 - present):

2011/12 Research highlighted in Department of Biology and COLS newsletters
2011 COLS website, CSU: commercial video highlighting research program
2010 Research highlighted in various media at CSU including brochures and billboards
2009 "Planting Seeds: Professor's Plant DNA research creates opportunities for students" FOCUS magazine Winter
2009 CSU Professor collaborates in plant DNA barcode breakthrough" IMPACT magazine August Vol.8, No.6
2009 "Plant Experts unveil DNA barcode" BBC NEWS
2009 "Botanist agree on DNA barcode for plant world" The Washington Post
2009 Interviewed on WTVM9- TV News on plant barcoding
2008 "Canadians find Plant DNA barcodes" University of Guelph Research News

Davis

University committees

Senate committees

2008-12 Scholastic Honors Committee
2008-12 Animal Use Committee

College of Science committees

2008-12 Recording secretary, African Studies Committee; member since 2003
2003-12 Preprofessional Committee
2009 Post tenure-review committee

Departmental committees

2008 Chair, Lab Coordinator/Instructor Search Committee (Klar Committee)
2009 Chair, Milwood Motley's Pre-Tenure Review Committee
2009-11 Outside member of the Pre-tenure Review Committee for Dr. Samuel Abegaz
2010 Outcomes Assessment Review Committee
2010-12 Departmental Standards of Excellence Committee on Compliance with College of Letters and Science Standards

Other Service Activities

2008 Served as Biology Department representative for Visitation Day:
2011-12 Served as judge for student oral presentations at Association of Southeastern Biologists Meeting

Service to Community

2005-9 Muscogee County Science Fair judge (Microbiology)
Lead Judge: (Environmental and Earth Sciences)
2005-12 Science Olympiad Scoring Coordinator
2008 Emergency Room Volunteer, Columbus Regional Medical Center
2010 Coliform Examination of Mountain Oak Creek for River Valley Regional Commission

Frazier

College Service

2011-12 Committee Member, COLS University Grants Review
2008 Committee Member, Grants Committee.
2008 Assistant Marshall, 50th Anniversary Convocation.

University Service

2012 Honors Candidates Recruitment Process
2012 Reviewer, CSU *Momentum*
2011-12 Comprehensive Program Review Committee, COLS.
2011-12 Publications Committee, COLS
2011 Faculty Representative/Student Recruiter, Opelika City Schools Parent Expo.
2009-12 Advisory or Planning Board, CSU Honors Advisory Board.
2008-10 Committee Chair, Jack Kent Cooke Foundation Selection Committee.
2007-10 Special Institutional Assignment, CSU Faculty Representative JKC scholarship.
2012 Chair, Dept. of Biology Zoology Search Committee.
2011-12 Committee Member, Dept. of Public Health and Exercise Science Search Committee.
2011 Faculty Representative, CSU Visitation Day.
2009-10 Committee Member, Dept. of Chemistry Lab Manager Search Committee.
2009 Committee Member, Dept. of Biology Lab Coordinator Search Committee.
2009 Committee Member, Strategic Planning Committee
2008 Committee Member, Environmental/Analytical Chemist Faculty Search Committee.
2012 Research Mentor, STEM Honors Camp, 3 regional High school students (research), Columbus State University, Columbus, GA
2011-12 Officer, Vice President, Morris Avenue Intermediate School, PTO, Opelika, Alabama.
2010-12 Officer, Vice President, Morris Avenue Intermediate School, PTO, Opelika, Alabama.
2009-10 3rd Grade Parent Coordinator, PTO, Opelika, Alabama.
2009 Guest Instructor, Morris Avenue Intermediate School, 3rd grade, Opelika, Alabama
2008-09 Officer, Vice President, PTO, Opelika, Alabama.
2008-12 Committee Member, Parent Advisory Committee (PAC), Opelika City Schools.
2007-08 1st Grade Parent Coordinator, PTO, Opelika, Alabama.
2006-07 Member, PTO, Opelika, Alabama.

Community Service

2012 Research and Teaching Mentor, STEM Honors Camp, 3 regional High school students (research) and 1 CSU Student (Teaching), Columbus State University, Columbus, GA
2011-12 Cookie Manager, Girl Scouts of America, Troop 7238, Opelika, Alabama.
2008-12 Assistant Troop Leader, Girl Scouts of America, Troop 7238, Opelika, Alabama
2008-09 World Thinking Day Coordinator, Girl Scouts of America, Troop 7238, Opelika, AL.
2010 Volunteer, United Way and Girl Scouts of America, Troop 7238, Opelika, AL
2009-10 Pentathlon Event Coordinator, Regional Science Olympiad, Columbus, GA.
2008 Write It Do It Event Coordinator, Regional Science Olympiad, Columbus, Georgia.

Hendricks

University

Chair, Facilities and Safety Committee (2005-2008, present)
Member (2005-present)

College

College Curriculum Committee (2008-present)

Department

Webmaster, Department of Biology (2005-present)
Curator of Invertebrate Museum (2005-present)
Member, Pre-tenure Review Committee for Dr. Milwood Motley (2008-present)

Other

Event organizer for “Amphibians and Reptiles”, Regional Science Olympiad (2008-2009)
Webmaster for Tri-Beta, Mu Omicron Chapter, accessible through departmental website (2004-2009)
Pre-tenure Review Committee for Dr. Zodiac Webster, Dept. of Geology & Chemistry (2006-2009)

Hughes

General Education Committee, Committee Member (2011-present)
Pre-Professional Advisory Committee, Committee Member (2007-present)
Math and Science Secondary Teacher Preparation, Committee Member (2008-present)
Secretary, American Association of University Professors, CSU chapter (2010-2012)
Science Olympiad Regional Tournament, Director (2010)
Science Olympiad Regional Tournament, Assistant Director (2009)
VistaCare Hospice, Volunteer, Columbus, GA, USA, Approximately 100 hours of service each year. (2006-2010)
Institutional Animal Care and Use Committee, Committee Member (2007-2009)
International Learning Communities Committee, Committee Member (2007-2009)

Klar

-Faculty Tower Day Judge at Columbus State University 2011 and 2012.
-Science Olympiad 2011- worked the registration desk.
-Department of Biology Space Committee chair 2011-2012.
-Organized the Annual Graduation Celebration for the Department of Biology 2010-present.

Motley

Judge, Columbus Public Schools Science Fair, 2006-2008, 2010
Event Coordinator, Science Olympiad, 2005-2009, 2011

Schwartz

SERVICE TO COMMUNITY:

- Presented on DNA testing in family history research and other topics to the Muscogee County Genealogical Society (2007, 2010, 2011)
- Panelist, discussion of evolution and creationism at the Springer Theater in conjunction with the play *Inherit the Wind*.
- Volunteered as Science Olympiad Event Supervisor (1997 - 2011)
- Volunteered for Help the Hooch River Cleanup (1996 – 1998, 2000 – 2011); served on the Organizing Committee (1997)

8. MAJOR COMMITTEES:

- Assistant Chair, Department of Biology (2010 – present)
- Task Force on Implementation of Degree Works (2012 – present)
- Business Intelligence Committee (2012 – present) – Committee to design a system for university data storage and retrieval to allow for better data analysis and decision making.
- Task Force on Shared Governance (2010 – present) – Extremely active including serving on a subcommittee to draft a statement of purpose of a proposed University Senate.
- Task Force on General Education Core Curriculum Reform (2009-2010) – Resulted in formulation and implementation of a new general education core curriculum; I was very active on the committee, including writing the first draft of Area D Natural Science learning outcomes.
- General Education Committee (2006 – present) – Resulted in general education core curriculum reform and formation of general education learning outcomes assessment plan.
- English Department Tenure and Promotion Committee (2010)
- Chair, Biology Chair Search Committee (2009) – Resulted in hiring of Julie Ballenger as chair.
- Academic Advising Committee (2009 – 2011)
    - Chair (2009 – 2010)
- Advisor (with Dr. Ballenger), Beta Beta Beta National Honor Society and Tri-Beta Biology Club (2003 – present)
- Phi Kappa Phi – Secretary (2003 – present); President (2002 – 2003)
- Columbus State University Faculty Senate (1998 – 2000, 2011 – present)

Stokes

Major Committees:

University:

Faculty Senate (1986-1990, 2010-2013)
Executive Officer (2010-2011,2011-2012)
Strategic Planning Committee (2008, 2011)
Faculty Handbook Committee (2012-2013)
Budget Advisory Committee (2010-present)
Master Plan Committee (2011-2012)
Whitley Scholarship Award Committee (2010-2012)

Columbus State University Board of Trustees, ex officio (2010-2012)
Provost and Vice President for Academic Affairs Search (2009)
Faculty Athletic Representative to the NCAA (1993-present)
Athletic Committee (1993-present)
Provost Search Committee (2008-2009)
NCAA Division II Membership Committee (2000-present)
Orientation Committee, 1998-present (Chair of Academic Session)

College of Science:
College Personnel Committee (1989-90, 2012-2013)

Regional:
Columbus College Chapter of Phi Kappa Phi Honor Society
Treasurer 2001-present
College representative to the State Arts and Sciences Dean's Council. 1992-2000, 2009-2013).

State:
Arts and Sciences Deans Advisory Committee 2006-present

Service to Community:
Judged Local Science Fair competitions at High School level every year
Lectures to area elementary school science classes, yearly.
Science Olympiad judge, 1988-2010. Event coordinator, 1997-2010.

Other Service
Peach Belt Conference Strategic Action Committee, 1998-2003, 2006-2010.
NCAA Division II Membership Committee (2000-2010), Chair
NCAA Division II Management Council (2004-2010), ARS Appeal Sub-Committee Chair, Infractions Appeals Committee

Zuiderveen

SERVICE TO COMMUNITY:
Leader for U-Teach summer camp (for high school students) at CSU: 2012
Southeast Regional Chapter of SETAC: (2002-present)
2002-03: Chair of the Ad Hoc Committee to re-establish the Chapter
2003-present: Board member (President:2003-04, Treasurer:2003-present)
Judge in the Greater Columbus Area Regional Science Fair (1995-2011)
Helped set up and judge for the Regional Science Olympiad (1997-present)
Judge for Columbus High School's Senior projects (2007, 2008, 2010-present)
Planning Committee for the 2008 National Meeting of the Society of Environmental Toxicology and Chemistry. (2007-08)
Assisted with "Help the Hooch" cleanup efforts (1998, 2007, 2008)

SERVICE TO COMMUNITY (not related to my scientific training):
Volunteer to work at Easter Seals for CSU Day for United Way, 2009.
Columbus Reads Program Volunteer for At-Risk Preschool Children, 2007-08.

MAJOR COMMITTEES: (all listed are within the University committees)
College of Science's Personnel Committee, 2008
College of Science's Post-tenure Review Committee, 2006, 2008
Human Subjects Review Committee, 2010-11.
Institutional Review Board, 2011-present.
Preprofessional Advisory Committee, 1994-present.
Chair: 2002-present
Faculty Senate, elected in 2000, 2005, 2009 (3 year terms)
2001-03, 2006-08: Executive Officer
2010-12: Senate representative on the Salary Study Committee
2012: Chair, Senate subcommittee on Student Fees

Other University Service:
Assistant Commencement Marshall, 2004, 2007, 2011
Faculty Advisor for CSU premedical chapter of the American Medical Student Association, 2001-present
Faculty Advisor for Baptist Collegiate Ministries, 2009-present
Faculty Advisor for the CSU Fishing Club, 2010-present
Faculty Volunteer for the Annual Fund Drive (Biology Dept.), 2000-present

COLUMBUS STATE UNIVERSITY

Summer 2010

Volume 1

Columbus State University's

Department of Biology

Chair's Corner

Greetings to our alumni and friends of Biology! I hope you enjoy reading through our newsletter, which we hope to publish annually. You will read about the many exciting changes in the department over the years and the outstanding academic and professional achievements of our students and faculty! Biology students routinely win awards for their research at the regional and national level.

We have developed a strong international program for both majors and non-biology majors. We have taken many classes to some of the most biologically-diverse environments in the world and have been fortunate to view exciting flora and fauna.

These opportunities give our students unique experiences and qualifications that set them apart when applying for graduate programs and jobs.

In addition to teaching, our faculty are engaged in cutting-edge research.

We look forward to your feedback and comments for future editions!

Julie Ballenger

Biology Department Chair

New Scholarship Honors Dr. George Stanton

The Biology Department is excited and honored to announce the inception of the George E. Stanton Enrichment Fund, to provide awards for students conducting undergraduate research in ecology and evolutionary biology. This fund has been established to honor the life-long dedication of Dr. Stanton to CSU, the College of Science, the Biology Department and the Columbus community.

Dr. Stanton began his career as an Assistant Professor at CSU in 1969. He served the Department of Biology as interim chair for two years, before taking the position of chair in 1982. His vision and passion guided the department until 2003 when he was asked to serve as interim dean of the College of Science. He was later appointed dean and led the college with the same dedication and balanced, thoughtful vision that he used to guide the department. Stanton became VP for Academic Affairs in 2005 and continued to serve CSU as a leader on campus and in the community until his semi-retirement in 2009.

Dr. Stanton's ability to act as an effective administrator, teach a variety of courses, and find time to conduct research and mentor students in their research is admirable. The successful biology international courses are directly related to his ability to embrace new ideas and have the leadership and vision to see the possibilities for integrating international programs into the curriculum.

In addition to his service to the university and community, Dr. Stanton is involved in many outreach programs. His vision, combined with that of Billy Turner (Columbus Water Works), resulted in the creation of Oxbow Meadows Environmental Learning Center in 1995. He has been an active member of many local boards.

Cont. on pg 3

Scholarship honoree George Stanton continues to share his enthusiasm for biology with students after 41 years at CSU

Students travelled to the rainforest of Costa Rica in 2008.

See page 6 for more photos from study abroad experiences.

Inside this issue:

Faculty & Staff Profiles

Dr. Julie Ballenger - Professor; Dept. Chair
- Joined CSU in 1995 (Ph.D. Miami University 1992)
- Interests: Botany, Plant Taxonomy, Molecular phylogenetics of plants.
- Current Research: Characterization and conservation of wetland plant communities in the Georgia fall line sand hills.

Dr. John Barone - Associate Professor
- Joined CSU in 2003 (Ph.D. University of Utah 1996)
- Interests: Ecology, Biodiversity, Conservation.
- Current Research: Community ecology and distribution of southeastern prairies; ecology of treeholes; structure of ant communities.

Dr. Bill Birkhead - Professor (semi-retired)
- Joined CSU in 1978 (Ph.D. University of Texas 1968)
- Interests: Vertebrate Biology (esp. natural history).
- Current Research: Long-term study of gopher tortoise burrows; fish host(s) of the purple bankclimber; fish of Fort Benning; vertebrates of Callaway Preserve.

Dr. Kevin Burgess - Assistant Professor
- Joined CSU in 2008 (Ph.D. University of Guelph, Canada 2004)
- Interests: Plant Ecological Genetics, Botany, Conservation Genetics.
- Current Research: Discriminating plant species and population genetics using DNA barcoding.

Dr. John Davis - Associate Professor
- Joined CSU in 2002 (Ph.D. Indiana University - Bloomington 1994)
- Interests: Microbial Biochemistry, Physiology and Genetics of Environmental Microbes.
- Current Research: Pink pigmented facultative methylotrophs; bacteria in pitcher plants; point source of *E. coli* in regional waterways.

Ms. Joy Davis - Administrative Secretary
- Joined CSU in 1983 (BA Columbus College 1980)

Dr. Monica Frazier - Assistant Professor
- Joined CSU in 2006 (Ph.D. University of Alabama at Birmingham 2001)
- Interests: Use of novel dietary compounds for the treatment of prostate cancer with an emphasis in bone metastasis.
- Current Research: Drug discovery research involving the use of dietary compounds as chemopreventive or chemotherapeutic agents against prostate cancer.

Dr. Harlan Hendricks - Professor
- Joined CSU in 1997 (Ph.D. Virginia Polytechnic Institute and State University 1993)
- Interests: Arthropod Ecology and Evolution, Insect Systematics.
- Current Research: Comparative toxicity of widow spiders in the Chattahoochee Valley.

Dr. Katey Hughes - Associate Professor
- Joined CSU in 2005 (Ph.D. University of Florida 2004)
- Interests: Functional Genomics, Neuroscience, Physiology.
- Current Research: Role of conjugated estrogens in celiac disease and oxidative stress.

Ms. Ely Klar - Lecturer; Laboratory Manager
- Joined CSU in 1996 (M.S. University of Georgia 1986)
- Interests: Anatomy and Physiology, Histology.
- Current Research: Histological assessment of physiological and anatomical change due to environmental impacts.

Dr. Milwood Motley - Associate Professor
- Joined CSU in 2005 (Ph.D. University of Louisville 1983)
- Interests: Medical Microbiology.
- Current Research: Virulence factors of pathogenic fungi; antiviral activity of proteins involved in innate immunity.

Dr. Brian Schwartz - Professor; Assistant Department Chair
- Joined CSU in 1996 (Ph.D. University of Wisconsin-Madison 1992)
- Interests: Genetics and Developmental Biology.
- Current Research: Copper utilization mutants in yeast; sex determination and copper utilization in the fern *Ceratoptoris richardii.*

Dr. George Stanton, Professor Emeritus
- Joined CSU in 1969 (Ph.D. University of Maine 1969)
- Interests: Aquatic Ecology; Conservation and Ecology of Crayfish; Aquatic Entomology.
- Current Research: Crayfish ecology; aquatic bioassessment; ecology of decomposition communities.

Dr. Glenn Stokes, Professor
- Joined CSU in 1983 (Ph.D. Pennsylvania State University 1981)
- Interests: Vertebrate Physiological Ecology, Herpetology.
- Current Research: Movement behavior patterns of turtles; cytotoxicity of orthodontic materials.

Mr. Carson Stringfellow - Assistant Professor; Safety Officer
- Joined CSU in 2006 (M.S. Columbus State University 1997)
- Interests: Freshwater Mussel Taxonomy & Ecology.
- Current Research: Freshwater mussel and native crayfish interactions; continued refinement of freshwater mussel classification.

Dr. Jeffrey Zuiderveen - Professor
- Joined CSU in 1994 (Ph.D. Univ. of Kentucky 1994)
- Interests: Aquatic Biology, Ecology and Toxicology.
- Current research: Feminization of male bass by pollutants; gerontogene effects on toxic responses.

Biology Degrees in Brief

Faculty members in the Biology Department believe in the importance of a *hands-on experiential program*. Courses are highlighted by extensive lab and field-based experiments. The philosophy of '*learning by doing*' has been, and will continue to be, a guiding principle in the department. Biology graduates are broadly trained and prepared for employment in a variety of fields or are ready for the challenges of graduate or professional schools.

The **Bachelor of Arts in Biology** major is designed to allow flexibility in the courses selected by students. Students build a program that best fits their goals and future plans by combining the core courses in biology with a minor in another academic discipline or a pre-approved minor equivalent.

Students may select a **BA in Biology with Secondary Education**. This program provides students with the experience and course work required for a degree in biology along with the expertise and pedagogical background to teach grades 6-12.

The **Bachelor of Sciences in Biology** is a more structured and prescribed degree and is most appropriate for students planning to pursue post-graduate studies. The curriculum requires students to develop and complete an independent research project that consists of a proposal, data collection, analysis and presentation of results.

In addition to those students in the BS program who conduct independent research projects, students in the BA and BA Secondary Ed programs have completed research projects as well. Students are encouraged to work with faculty mentors to develop and successfully complete their research. The final degree, no matter whether a BA, BA Secondary Ed or BS, should reflect the experience desired by the student. Students are encouraged to exercise control over the development of their degree program within the limits of the major.

Stanton Scholarship Announced

Continued from page 1

Stanton serves on the Board of Directors for Trees Columbus, was on the Board for the Chattahoochee Riverkeeper, and was a long-time member of the Muscogee County Board of Education. It is the culmination of years of service, hard work, experience and leadership at CSU and in the community that make George Stanton the perfect choice to honor with a new enrichment fund.

In addition to the new fund, the Biology Department has two other funds. The Flora M. Clark Fund for Improving Biology provides awards for undergraduate students interested in cellular and molecular research and also provides travel scholarships. The Van H. Grosse Fund for Bioethics was developed to support seminars in bioethics on campus.

In the fall, Biology faculty will personally call alumni to ask for donations to support scholarship funds.

Student & Faculty Achievements

CSU Student Awards

Honors Convocation (April) awardees:

- **Biology Education Award** - Katherine Moultrie
- **Cellular & Molecular Biology Award** - Samantha Nieves
- **Organismic Biology Award** - Nakita Burden
- **Ecological & Evolutionary Biology Award** - Amy Schabel
- **George Stanton Biology Award** - Stewart Helton (*below*)

CSU Student Employee of the Year – De'smond Henry

De'smond Henry is honored as Student Employee of the Year by Gina Sheeks (VP for Student Affairs) & President Tim Mescon.

CSU Faculty Awards

CSU Faculty Research & Scholarship Award Winner – Dr. Kevin Burgess *(right)*

CSU Faculty Service Award Nominee – Dr. Katey Hughes

CSU Faculty Emeritus – Dr. George Stanton

Fort Hays State University Alumni Achievement Award Winner – Dr. Julie Ballenger

Regional Awards

Association of Southeastern Biologist Annual Meeting, **Southeastern Regional Beta Beta Beta Award winners**:

2nd Place Johnson Award Winner: Nakita Burden (Identifying complex taxonomic groups of native and cultivated Rhododendrons using DNA barcoding.)

3rd Place Johnson Award Winner: Jennifer Silvers (Effects of natural anti-inflammatory agents on toll-like receptor 2 expressions: Implications for *Lyme neuroborreliosis* response.)

District II Outstanding BBB Advisor: Dr. Julie Ballenger

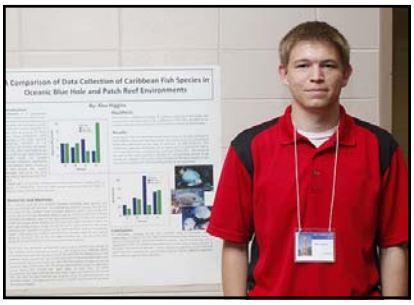
Alumni Accomplishments

If you or an alum you know have attended graduate school or are working, please send us an update to:

Biology Department
Columbus State University
4225 University Ave
Columbus, GA 31907

Student Research Projects

The Department of Biology offers an opportunity to complete an undergraduate research experience in the B.S. degree in biology. The department has been at the front in a national trend to provide such experiences for undergraduate students. The purpose of this research experience is to enable students to better develop critical thinking and those intellectual and technical skills associated with planning, executing, and communicating research discoveries.



M. Alex Higgins, an Applied Computer Science major, presented his research on Caribbean fish species at CSU Tower Day in April 2010

2010 graduate Amy Schabel studied seasonal bacteria populations in a pitcher plant

Student(s)	Advisor	Presented At	Research Project
Neena Alex, Eunhye Cho & Keeli Johnson	Dr. Katey Hughes	CSU Tower Day	Bahamian bush medicine: a study based on the Andros Study Abroad Experience.
Nakita Burden	Dr. Kevin Burgess	ASB/BBB and CSU Tower Day	Identifying complex taxonomic groups of native and cultivated Rhododendrons using DNA barcoding.
Eunhye Cho & Melora Slotnick	Dr. Katey Hughes	CSU Tower Day	Faces of Andros.
Christina Cox	Dr. Bill Birkhead	CSU Tower Day	Distribution and relative abundance of meso-predators in the Memorial Forest on the Callaway Preserve, Harris County, Georgia: A second survey.
Alex Higgins	Dr. Bill Birkhead	CSU Tower Day	A comparison of Caribbean fish species in oceanic blue hole and patch reef environments.
Chris Moore	Dr. Brian Schwartz	CSU Tower Day	The effect of distance on the frequency of cross-fertilization between C-fern gametophytes.
Meg Rynearson	Dr. Bill Birkhead	CSU Tower Day	Invertebrate communites in calcareous algae.
Amy Schabel	Dr. Julie Ballenger & Dr. John Davis	ASB/BBB and CSU Tower Day	Classification of seasonal bacteria populations growing in a *Sarracenia rubra* pitcher.
Jennifer Silvers	Dr. Katey Hughes	ASB/BBB and CSU Tower Day	Effects of natural anti-inflammatory agents on toll-like receptor 2 expression: Implications for *Lyme neuroborreliosis* response.
Beverly Whitt	Dr. Bill Birkhead	CSU Tower Day	Effect of an artificially applied caudal spot near the anal fin of fishes as related to avoidance of predation.

***Left**: Beverly Whitt explains her research to fellow students Jennifer Silvers and Christina Cox at CSU Tower Day*

***Right**: Dr. Kevin Burgess assists Nakita Burden with collecting Rhododendron specimens for her DNA barcoding research*

Student Biological Organizations

Beta Beta Beta

Beta Beta Beta (Tri *Beta)* is an honor and professional society for students majoring in biology and for those with interests in the natural sciences. The focus of this organization is to foster undergraduate research and it is dedicated to improving the understanding of the process of science. The CSU Department of Biology Mu Omicron chapter was founded in 1994. It is a very active and successful program on the CSU campus. The chapter has been involved in the annual "Help the Hooch" cleanup along the Chattahoochee River and the Science Olympiad Regional Tournament, and members have served as judges for the regional Science Fair for several years. In addition, the club has organized rafting and camping trips both locally and to the north Georgia Mountains.

TriBeta members & biology faculty oversee the annual plant sale (a club fundraiser)

Members have been very successful in competing for and receiving research scholarships as well as regional and national awards for their research. Many students have won research scholarships which help defray costs associated with their independent senior research projects. Seventeen students who have presented their research at regional meetings have received the Frank G. Brooks award for outstanding paper presentations and five students have won the Johnson Award for outstanding posters. In addition, three students have gone to national meetings and won awards. Three students have had their senior research published in BIOS, the BBB society journal.

The Mu Omicron Chapter has been recognized at the national level by winning the Bertholf Award. This award honors those chapters that excel in scholarship and dissemination of scientific information through presentations and publications, and in promotion of scientific research. In 2003-2004 the chapter was recognized as being in the top 10% of chapters in the nation. In 2004-2005 Mu Omicron was again recognized with a Bertholf Award of honorable mention (placing us third in the nation) and in 2006-2007 the chapter earned the highest honor with a first-place Bertholf Award.

Chapter President: Nylvia Ware

Chapter Vice President: Terry Langfitt

Advisors: Dr. Julie Ballenger, Dr. Brian Schwartz

AMSA

The *American Medical Student Association* (AMSA) is a national organization dedicated to representing and organizing future health professionals. The CSU chapter's mission is to inform, support, and provide leadership development for any interested health pre-professional students at CSU, whether they're pre-medicine, pre-pharmacy, pre-dentistry, a nursing major, or a health science major. While most members are biology majors, there are also members majoring in chemistry, psychology, and computer science.

The main mission of AMSA at CSU is to provide students with opportunities to do community service, as well as to assume leadership roles. Community activities, ranging from health screenings to fostering the city's youth, help students prepare for a career in health professions. The club has guest speakers every month who talk about the challenges of getting into medical, dental and other professional schools, as well as discuss their current activities in their profession.

Chapter President: Roma Patel

Chapter Vice President: Neena Alex

Advisor: Dr. Jeff Zuiderveen

AMSA members - 2009-2010

PVMA

The CSU Pre-Veterinary Medical Association (PVMA) was founded through the work of Contessa Bowman, a biology major who is currently in her third year at Tuskegee Vet School. The club is open to all students with an interest in veterinary medicine, regardless of major or concentration. The PVMA encourages participation in activities to strengthen the community and the individual.

The club has participated in the annual "Help the Hooch" river cleanup and the Walk for the Cure (canine version), and volunteered for local humane organizations (including helping with the relocation of Paws Columbus to their new facility), among other service commitments.

Members have taken trips to area veterinary schools and conducted mock interviews for veterinary school applicants.

The club has biweekly meetings during which they have had local veterinarians, veterinary instructors from regional vet schools, and other speakers of general interest to members.

Members of the PVMA club with advisor, Dr. Glenn Stokes

The PVMA has sponsored three entertaining pet shows, where the CSU community and general public could bring their cats and dogs to compete in several categories, including best trick, most obedient, and pet-owner look-alike.

The club won second place in the inaugural homecoming banner competition in their first year as a formal club.

Chapter President: Samantha Tillery

Chapter Vice President: Jaime Reed

Advisor: Dr. Glenn Stokes

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International Programs

Since 1999 CSU's Department of Biology has offered 23 international programs to 282 students. Andros Island in the Bahamas was the first international program established. The experience immersed students in the ecology of the Bahamas. They spent a week on the island becoming familiar with the flora and fauna of the area and then set up and conducted a variety of mini-ecology projects. Students collected data on-site, then completed their analyses and project presentations upon returning to CSU.

Andros Is., Bahamas - Invertebrate research project

The department has since added similar programs in Botswana (Africa), Queensland (Australia), Ecuador, and Costa Rica. Each site was carefully selected based on safe access to a wide diversity of pristine habitats and the opportunity for students to experience customs and culture of the countries visited.

Botswana, Africa - Tea time with a herd of elephants

La Selva Biological Station, Costa Rica - Learning the flora of the rainforest

Great Barrier Reef, Queensland, Australia - Diving to view sea anemone

Fitzroy Island, Queensland, Australia - Dr. Birkhead reviews protocol for fish survey

The courses explore the unique ecology, flora and fauna of each area and provide students with the hands-on experience of developing and setting up field-based research projects.

Some of the magnificent wildlife of Africa

Magnetic Island, Queensland, Australia, - Koalas kicking back

La Selva Biological Station, Costa Rica - Emerald basilisk

In 2004 the department's success with international programming was recognized when it was selected as the **"Best Practices in International Education: Most Internationalized Academic Unit"** by the University System of Georgia Board of Regents.

Over the past few years, biology classes have studied ecosystems in Belize, Costa Rica, Bahamas, Ecuador, Africa and Australia.

In 2007 the department added the first CSU international service learning course. This course offers pre-professional health-focused majors an opportunity to serve in the health clinics on Andros Island in the Bahamas. Students study the biological basis of a specific health issue facing the Bahamian people and then discuss this issue with Andros communities and clinics. They also donate needed medical supplies to clinics.

Andros Is., Bahamas - Students meet local bush medicine woman, Mrs. Marshall, and model hats she made

These field-oriented courses may be taken as BIOL 1225 to satisfy the lab science requirement of Area D, or as a BIOL 5535 for Area G.

Recent Graduates

Congratulations to those who graduated in December 2009 and May 2010!

B.S. in Biology:
- Nakita Burden (Pre-Medical)
- Kevin Cogdell (Pre-Dental)
- Christina Cox
- Chris Moore
- Adam Nguyen
- Amy Schabel (Pre-Pharmacy)
- Jennifer Silvers
- Stephanie Sponseller
- James Webster Jr.
- Beverly Whitt

B.A. in Biology:
- Mary Barrow (Pre-Medical)
- Jose Canedo
- Angela Cruz (Pre-Medical)
- Christina DiGregorio (Pre-Pharmacy)
- Alicia Garcia
- Shakema Goodman
- De'smond Henry
- Renee Ogundana (Pre-Medical)
- Ryan Richardson
- Takeema Richardson
- Tiffany Tisdale

B.A. in Biology and Secondary Ed.:
- Andrew Hartzog
- Diana Humphries
- Katherine Moultrie
- Susan Stebbins

Recent graduates (L-R) - De'smond Henry, Amy Schabel, Christina Cox, Katherine Moultrie, Jennifer Silvers, & Christina DiGregorio

Faculty Research &Presentations

Publications:

Barone, J.A., Adams, L.W., Coan, A.C., Joiner, M.J., Rayford, C.N. and **Burgess, K.S.** 2010. *Influence of individual, local and regional-level factors on tree hole abundance.* Forest Ecology and Management (submitted).

CBOL Plant Working Group (**Burgess, K.** et. al.) 2009. *A DNA barcode for land plants.* Proceedings of the National Academy of Sciences USA 106: 12794-12797.

Presentations:

M.B. Hendricks & **H. Hendricks** 2010. *The use of rubrics for promoting and evaluating student learning*. 8th Annual Interdisciplinary Conference for Teachers of Undergraduates, Barnesville, GA.

John A. Barone, LeQuita W. Adams, A. Carmen Coan, Michael J. Joiner, Courtney N. Rayford & **Kevin S. Burgess**, 2010. *Influence of individual, local and regional factors on tree hole abundance*. Association of Southeastern Biologists, Asheville, N.C.

Kevin S. Burgess, Aron J. Fazekas, Prasad R. Kesanakurti, Sean W. Graham, Mehrdad Hajibabaei, Steven G. Newmaster, Diana M. Percy, Brian C. Husband, Spencer C. H. Barrett. *Barcoding a local flora using the rbcL+matK barcode.* Society for the Study of Evolution. Portland State University, Portland, Oregon.

Ivan Shoemaker & **Kevin S. Burgess**. *Tracking Floral Visitation Using DNA Barcodes.* Society for the Study of Evolution. Portland State University, Portland, Oregon.

Prasad R. Kesanakurti, Aron J. Fazekas, **Kevin S. Burgess**, Spencer C. H. Barrett, Sean W. Graham, Mehrdad Hajibabaei, Steven G. Newmaster, Diana M. Percy, Brian C. Husband. Third International Barcode of Life Conference, Mexico City, Mexico.

Sean W. Graham, Prasad R. Kesanakurti, Aron J. Fazekas, Diana M. Percy, **Kevin S. Burgess,** Jeffery M. Saarela, Steven G. Newmaster, Brian C. Husband, Mehrdad Hajibabaei, Spencer C. H. Barrett. The Biota-FAPESP International Symposium on DNA Barcoding, Sao Paolo, Brazil.

Guest Speakers:

John Barone – Auburn University, Auburn, Alabama. Distribution & ecology of southeastern prairies.

Kevin Burgess – University of Georgia; North Georgia College and State University; Emory University. Discriminating plant species using DNA barcodes.

Julie Ballenger – Fort Hays State University, Hays, Kansas. Characterization and conservation of wetland plant communities in the Georgia fall line sand hills; A road less traveled: incorporating international field experiences into a biology curriculum.

Contracted Research:

Bill Birkhead - Survey of fishes inhabiting sandhills streams of the Ft. Benning Reservation. (Osage, Inc.)

Survey for the Bluestripe Shiner, Alligator Snapping Turtle and Barbour's Map Turtle in the vicinity of the confluence of Upatoi Creek and the Chattahochee River. (J. Carter & Assoc. - contract pending)

Carson Stringfellow & Bill Birkhead - Determination of the fish host for the purple bankclimber. (U.S. Fish & Wildlife Service)

Carson Stringfellow - Freshwater Mussel Workshop at the Jones Research Center. (USFWS)

Julie Ballenger - Characterization and conservation of wetland plant communities in the Georgia fall line sand hills. (The Nature Conservancy)

Grant Submissions:

M. Motley - Role of Gliotoxin in Aspergillosis. (National Institutes of Health)

B. Brosi (PI), **K. Burgess** (Co-PI), P. Armsworth (Co-PI), and J. Dunne (Co-PI). Functional pollination networks & the maintenance of species & genetic diversity. (National Science Foundation Collaborative Proposal)

K. Burgess (PI), **J. Barone** (Co-PI), S.G. Newmaster (Co-PI). Structure of pollination webs in prairie remnants: analysis with DNA barcoding. (NSF)

K. Burgess (PI). Genetic analysis of Red Mulberry at Royal Botanical Gardens, Hamilton, Ontario, Canada. (RBG)

A. Garcia, M. Elmore, **J. Ballenger** and **K. Burgess**. Demographic and genetic consequences of small population size in *Arabis georgiana* (Georgia Rockcress). (USFWS - received; Georgia Native Plant Society - submitted)

COLUMBUS STATE UNIVERSITY

Department of Biology

4225 University Ave
Columbus, GA 31907

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Did You Know? Some facts about the department...

The first BS in Biology was awarded at Columbus College **41** years ago. Nine students were awarded biology degrees that year, including Carson Stringfellow, who is now a member of the faculty.

The Biology Department was created in **1982**. The labs were in the Tucker Building (now Tucker Hall). Faculty offices were in Tucker, Howard and Faculty Office Building.

Bio Club members outside the Tucker Building in the early 1980s

The Biology Club was formed in **1970**. Kathy Miller was the first president and George Stanton was the first faculty advisor. In **1994** the club became the *Mu Omicron* Chapter of *Beta Beta Beta*. The chapter has been recognized several times as an outstanding chapter in the region and in the nation, and for outstanding faculty advisor and chapter history.

Today, **15** faculty work with over **400+** biology majors, teaching introductory biology, providing courses for nursing students and graduate students in the environmental science program, and mentoring student research projects.

Many Beta Beta Beta students have won regional awards

Biology students began presenting their research at regional *Beta Beta Beta* meetings in **1997**, and since then many CSU students have won first, second or third place awards. The first regional winner went on to place 2nd at the national meeting.

The Biology Department continues to attract some of the strongest students on campus, with **17** biology majors being awarded the Faculty Cup since 1960.

Members of the 1979 National Science Foundation research team

Building upon the experiences of more than 60 students who participated in NSF-supported projects in the 1970s, undergraduate research has remained an important component of the curriculum.

Department Contact Information:
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COLUMBUS STATE UNIVERSITY

Summer 2011

Volume 2

Columbus State University's

Department of Biology

Chair's Corner

Greetings, alumni and friends of Biology! It's been great to reconnect with many of you by phone, e-mail or Facebook. My goal is to contact even more of you this year, with enlisted help, so we can update our alumni success stories. I'd like to thank those of you who shared your updates and those who were able to support our scholarships. With your generous support we raised $20,255 in scholarship funds. This is unprecedented and was a humbling experience for me to witness your generosity. If you are able to donate to any of our scholarship funds this year, please use the enclosed pledge card. We welcome any updates from you, which can be written on the back of the card. Next year, with your permission, we would be honored to share your news here.

Beginning fall 2011 we will offer our current biology students internship opportunities. This will provide students real world experiential learning and opportunities that can't be obtained at CSU. Interns will develop projects in which they can analyze data and present their findings to their peers and faculty members. We are currently working with Columbus Water Works, The Nature Conservancy, Warm Springs Fish Hatchery and other businesses to further develop these internship opportunities. If you are interested in developing an internship through your business, please contact me so we can explore our options.

Find us on Facebook at Columbus State University Department of Biology - read about our studies abroad and student research!

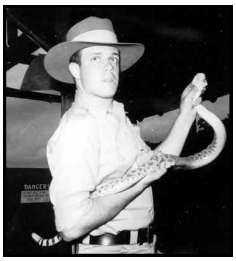
I hope you enjoy this issue. I look forward to hearing from you!

Julie Ballenger

Biology Department Chair

Bill Birkhead honored as Emeritus Professor

Dr. William Birkhead grew up catching fish, snakes and turtles, wrestling alligators and chasing birds.... come to think of it, that is still what he's doing! Any of you who have had classes with him will understand that every stream must be seined, all snakes must be caught (including the venomous ones) and alligators of a certain size are fair game. Being in the field with Dr. Birkhead is an experience; you never know what you are going to find, see, touch, smell or be asked to be a participant in for the greater good of the class.

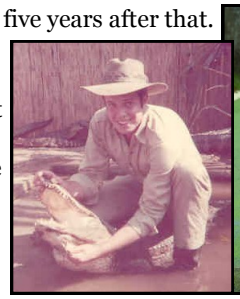


Dr. Birkhead was instrumental in the evolution and success of our vibrant international programs in the Biology Department. Bill and I worked together to develop a variety of international ecology courses that expose students to different environments and cultures. Each site was carefully selected based on an intact ecosystem and the biodiversity found in the area. Bill's diverse background allowed him to guide students in terrestrial as well as aquatic habitats. His passion and drive to see and do everything propelled him through these experiences and in the process wore out students one-third his age!

Bill Birkhead joined the CSU Biology faculty members (then Columbus College) in 1978 as an Assistant Professor in Biology; five years later he was promoted to Associate Professor and then to Professor five years after that. He served the Biology Department as Assistant Chair from 1997-2003. In 2003 he took the position of Department Chair, which he held for the next six years. His knowledge and extensive history at CSU and in the University System of Georgia was vital through the transition years of a new president and vice-president/provost. He was a thoughtful and passionate leader as Department Chair who cared deeply about the faculty members and students in biology, but in reality, he truly hated the paperwork involved with the position. The increasing demands of an administrative appointment took him away from the things that make him tick...catching fish, snakes and turtles, wrestling alligators (although we see less of this now) and chasing birds!

Dr. Birkhead continues to serve the department part-time, where he shares his expertise in our senior electives teaching ornithology, ichthyology, and mammalogy, mentoring student research projects and enjoying every international course available. It appears that order has been restored and he is back doing the things he loves most!

- Julie Ballenger



Then and now...Bill Birkhead never met a reptile that he couldn't catch!

Inside this issue:

Faculty & Staff Profiles

Dr. Julie Ballenger - Professor; Dept. Chair
- Joined CSU in 1995 (Ph.D. Miami University 1992)
- Interests: Botany, Plant Taxonomy, Molecular phylogenetics of plants.
- Current Research: Characterization and conservation of wetland plant communities in the Georgia fall line sand hills.

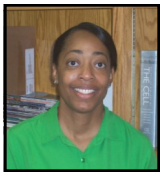
Dr. John Barone - Associate Professor
- Joined CSU in 2003 (Ph.D. University of Utah 1996)
- Interests: Ecology, Biodiversity, Conservation.
- Current Research: Community ecology and distribution of southeastern prairies; ecology of treeholes; structure of ant communities.

Dr. Bill Birkhead - Professor Emeritus
- Joined CSU in 1978 (Ph.D. University of Texas 1968)
- Interests: Vertebrate Biology (esp. natural history).
- Current Research: Long-term study of gopher tortoise burrows; fish host(s) of the purple bankclimber; fish of Fort Benning; vertebrates of Callaway Preserve.

Dr. Kevin Burgess - Assistant Professor
- Joined CSU in 2008 (Ph.D. University of Guelph, Canada 2004)
- Interests: Plant Ecological Genetics, Botany, Conservation Genetics.
- Current Research: Discriminating plant species and population genetics using DNA barcoding.

Dr. John Davis - Associate Professor
- Joined CSU in 2002 (Ph.D. Indiana University - Bloomington 1994)
- Interests: Microbial Biochemistry, Physiology and Genetics of Environmental Microbes.
- Current Research: Pink pigmented facultative methylotrophs; bacteria in pitcher plants; point source of *E. coli* in regional waterways.

Ms. Joy Davis - Administrative Secretary
- Joined CSU in 1983 (BA Columbus College 1980)



Dr. Monica Frazier - Associate Professor
- Joined CSU in 2006 (Ph.D. University of Alabama at Birmingham 2001)
- Interests: Use of novel dietary compounds for the treatment of prostate cancer with an emphasis in bone metastasis.
- Current Research: Drug discovery research involving the use of dietary compounds as chemopreventive or chemotherapeutic agents against prostate cancer.

Dr. Harlan Hendricks - Professor
- Joined CSU in 1997 (Ph.D. Virginia Polytechnic Institute and State University 1993)
- Interests: Arthropod Ecology and Evolution, Insect Systematics.
- Current Research: Comparative toxicity of widow spiders in the Chattahoochee Valley.

Dr. Katey Hughes - Associate Professor
- Joined CSU in 2005 (Ph.D. University of Florida 2004)
- Interests: Functional Genomics, Neuroscience, Physiology.
- Current Research: Role of conjugated estrogens in celiac disease and oxidative stress.

Ms. Ely Klar - Lecturer; Laboratory Manager
- Joined CSU in 1996 (M.S. University of Georgia 1986)
- Interests: Anatomy and Physiology, Histology.
- Current Research: Histological assessment of physiological and anatomical change due to environmental impacts.

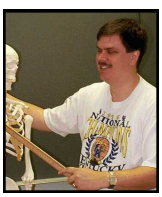
Dr. Milwood Motley - Associate Professor
- Joined CSU in 2005 (Ph.D. University of Louisville 1983)
- Interests: Medical Microbiology.
- Current Research: Virulence factors of pathogenic fungi; antiviral activity of proteins involved in innate immunity.

Dr. Brian Schwartz - Professor; Assistant Department Chair
- Joined CSU in 1996 (Ph.D. University of Wisconsin-Madison 1992)
- Interests: Genetics and Developmental Biology.
- Current Research: Copper utilization mutants in yeast; sex determination and copper utilization in the fern *Ceratoptoris richardii.*

Dr. George Stanton, Professor Emeritus
- Joined CSU in 1969 (Ph.D. University of Maine 1969)
- Interests: Aquatic Ecology; Conservation and Ecology of Crayfish; Aquatic Entomology.
- Current Research: Crayfish ecology; aquatic bioassessment; ecology of decomposition communities.

Dr. Glenn Stokes, Professor
- Joined CSU in 1983 (Ph.D. Pennsylvania State University 1981)
- Interests: Vertebrate Physiological Ecology, Herpetology.
- Current Research: Movement behavior patterns of turtles; cytotoxicity of orthodontic materials.

Mr. Carson Stringfellow - Assistant Professor; Safety Officer
- Joined CSU in 2006 (M.S. Columbus State University 1997)
- Interests: Freshwater Mussel Taxonomy & Ecology.
- Current Research: Freshwater mussel and native crayfish interactions; continued refinement of freshwater mussel classification.



Dr. Jeffrey Zuiderveen - Professor
- Joined CSU in 1994 (Ph.D. Univ. of Kentucky 1994)
- Interests: Aquatic Biology, Ecology and Toxicology.
- Current research: Feminization of male bass by pollutants; gerontogene effects on toxic responses.

Meet our newest faculty member!

Jennifer Newbrey (Ph.D. North Dakota State University 2007) has recently arrived from the University of Alberta. Her research interests lie at the interface between avian ecology and biology, with an emphasis on wetland ecosystems and wetland-dependent bird species. Her research has focused on avian reproduction, avian physiology, lake and wetland habitats, aspects of population dynamics, and food-web interactions.

On Sabbatical with John Barone

I spent the spring semester of 2010 on sabbatical, working at the Mississippi Entomological Museum (MEM) located at Mississippi State University. The break afforded me the opportunity to pursue a variety of projects. For example, I continued work on a research project with collaborators at the MEM and the National Park Service to determine the most ecologically efficient and cost-effective method for restoring degraded prairies along the Natchez Trace Parkway. The sabbatical gave me the time to collect more detailed data on the project as well as begin data analysis. I also worked on several research papers, summarizing the results of previous studies for publication. During the sabbatical, I also prepared a new course, Biology 5535--Community Ecology, which I taught in the fall 2010 when I returned to CSU. Other projects included developing skills in ant and moss identification, the preparation of over 1,000 plant specimens for the CSU herbarium, the submission of a grant proposal to the National Science Foundation, and learning the programming language "R", which is frequently used in statistical analyses. The sabbatical was a wonderful chance to re-charge, work on long-delayed projects, and learn new skills that I can bring to the classroom.

Faculty Awards, Presentations & Research

Awards:

Julie Ballenger - Outstanding Faculty in Study Abroad; keynote speaker - Phi Beta Delta (International Honor Society) induction ceremony, 2011.

Kevin Burgess - CSU Faculty Research Award finalist, 2011.

Grants:

J. A. Barone. Collection of Pollination Network Data for Blackland Prairies. CSU Faculty Development Grant, 2011.

R. Bringolf (University of Georgia), C. Jennings (USGS) and **J. Zuiderveen** (CSU). Assessment of Endocrine Disruption in Fish and Estrogenic Potency of Waters in Georgia. Georgia Water Resources Institute (GWRI).

Presentations:

J. Ballenger. 2011. *Exceptional rarity and carnivory: characterizing wetland plant communities in the fall line sand hills*. Invited speaker - Auburn University Biology Department.

J. A. Barone, J.G. Hill & L. McInnis. 2011. *Evaluation of prairie restoration techniques in blackbelt prairies of Mississippi*. Association for Southeastern Biologists, Huntsville, AL.

B. Schwartz, R. Moore, and J. Bosanko. 2011. *Assessment of the ecological significance of a male-inducing pheromone in the fern* Ceratopteris richardii. Georgia Academy of Science, Gainesville State College, Oakwood, GA.

N. Ware and **M. Motley**. 2010. *Antiviral effects of Lactoferrin at different stages of Herpes Simplex Virus, Type 1 infection of vero cells*. Southeastern Branch - American Society for Microbiology Meeting, Montgomery, AL.

Zuiderveen, J. and **Stringfellow, C.** 2010. *Mussel Surveys of the Chattahoochee River, GA, and implications about water quality changes*. Society of Environmental Toxicology and Chemistry Annual Meeting, Portland, OR.

Research:

Birkhead, B. (2010-2011) An ichthyologic survey of the Chattahoochee River between Dillingham Bridge and North Highlands Dam conducted in association with a Chattahoochee River Restoration Project, Columbus, Muscogee County, GA.

Birkhead, B. and **Stanton, G.** 2011. *Undergraduate research & the tenure & promotion process*. CUR Quarterly 31 (4).

Burgess, K.S., Fazekas, A.J., Kesanakurti, P.R., Graham, S.W., Husband, B.C., Newmaster, S.G., Percy, D.M., Hajibabaei, M., and Barrett, S.C.H. 2011. *Discriminating plant species in a local temperate flora using the rbcL+matK DNA barcode*. Methods in Ecology and Evolution (in press).

Chadwick, J. and **Stanton, G.E.** 2011. *Habitat characteristics and conservation status of Three Pennides crayfish in Marion County, GA*. Southeastern Naturalist (in press).

Elmore, M., **Ballenger, J.** and Harrison, W. 2010. *Exceptional rarity and carnivory: characterizing wetland plant communities in the fall line sand hills*. Longleaf Alliance 8th Regional Conference, Columbia, SC.

Hughes, K. 2011. *Peer-assisted learning strategies in Human Anatomy & Physiology*. American Biology Teacher 73 (3).

Kesanakurti, P.R., Fazekas, A.J., **Burgess, K.S.**, Percy, D.M., Newmaster, S.G., Graham, S.W., Barrett, S.C.H., Hajibabaei, M., and Husband, B.C. 2011. *Spatial patterns of plant diversity belowground as revealed by DNA barcoding*. Molecular Ecology 20: 1289–1302.

Laurance W.F. et al. (including **J.A. Barone**) 2011. *Global warming and the vulnerability of tropical biota: where do the thermal specialists live?* Biological Conservation 548-557.

Shoemaker, I. and **Burgess, K.S.** 2010 *Genetic Analysis of Red Mulberry at Royal Botanical Gardens, Hamilton, Ontario, Canada*. Report to the Royal Botanical Gardens.

Swenson, N.G., Anglada-Cordero, P. and **Barone, J.A.** 2011. *Deterministic tropical tree community turnover: evidence from patterns of functional beta diversity along an elevational gradient*. Proceedings of the Royal Society B: 278:877-884.

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Student Research & Presentations

Undergraduate research experiences enable students to develop critical thinking and intellectual and technical skills associated with planning, executing, and communicating research discoveries. Fall 2010 and Spring 2011 research projects are listed below.

Student	Faculty Advisor	Senior Research Projects* & Tower Day Presentations†
Khaliyah Abikoye	Monica Frazier	REU at MSU from CSU: the importance of undergraduate research.†
Ifeoma Akuta	Katey Hughes	The effect of Brilliant Blue G and methylprednisolone acetate on IL-1β mRNA levels in trauma-induced astrocytes.†
Jasmine Bailey	Katey Hughes	The role of Adiponectin and Leptin on cell viability in cultured rat insulinoma beta cells.*
Nakita Benson	Bill Birkhead	Box turtle fidelity.*
Patronya Brogdon	Kevin Burgess	The effects of rhizobial inoculum on plant growth.*
Rae Bucher	Julie Ballenger	Nitrate phytoremediation using Gempler's test kits.*†
Cristina Caldwell	Bill Birkhead	The IBI (index of biotic integrity) of Hannahatchee Creek.*
Patricia Campbell	Kevin Burgess	Efficacy of the rbcL+matK barcode in the taxonomically complex groups of Rhododendron.*† **(photo below)**
Benjamin Cupp	Ely Klar	Histology: study of tissues.†
Timothy (Blake) Duvall	John Davis	Bacterial diversity in the water within the pitchers of *Sarracenia leucophylla* and *S. purpurea* at the same location.* **(see photo opposite page)**
Bailee Farmer	Harlan Hendricks	Toxicity of *Latrodectus geometricus* (brown widow) spiders.*
Olumuyiwa Fatade	Milwood Motley	Detection of gliotoxin.*
Akeeta Harris	Monica Frazier	The detection of Hg^{2+} with functional DNA and gold nanoparticles.*
Stewart Helton	Brian Schwartz	Male interactions of *Ceratopteris richardii* during sexual conversion.*
Henry Hutcheson	Bill Birkhead	Food habits of Redbreast Sunfish, *Lepomis auritus*, and Bluegill, *L. macrochirus*, in Lindsey Creek, Columbus, Muscogee County, Georgia.*
Michal Joiner	John Davis	Gram-negative flora of the surface mucus layer of the Bluegill, *Lepomis macrochirus*.*
Monica Junious	Ely Klar	Morphological differences in nervous tissue highlighted by contrasting histological stains.†
Sara Lindsey	Monica Frazier	The effects of curcumin on colon cancer cells.*
Lakeshia Mallard	John Barone	Chinese Privet and its suppression in native species.*
Eli Mitcham	John Davis	Bacterial diversity in the water within the pitchers of *Sarracenia rubra* in different localities.*
Tony Nguyen	Monica Frazier	Effects of exercise on the expression levels of Matrix Metalloproteinase (MMP)-23 in the supraspinatus tendons of Sprague-Dawley rats.*
Joseph Parsi-Graciani	Monica Frazier	The effects of 17-allylamino-demethoxygeldanamycin (17-AAG) on the apoptotic cell signaling pathways of PC-3 Cells.*
Roma Patel	Glenn Stokes	Potential cytotoxicity of colored orthodontic latex bands to human fibroblast cells.*†
Anthony Peters	Brian Schwartz	Characterization and attempted functional complementation of a copper mutant in *Saccharomyces cerevisiae*.*
Clarence Powell	Katey Hughes	Effect of coenzyme Q on myoblast viability.*
Ashley Purvis	Jeff Zuiderveen	The effect of nickel and zinc on a gerontogene mutant of *Caenorhabditis elegans*.*
John Rivera	George Stanton	Crayfish burrowing activity.*
Janay Ross	Brian Schwartz	Analyzing copper metabolism mutants of *Saccharomyces cerevisiae* for reverse mutation and intergenetic suppression.*
Tyree Sharpe	John Barone	Dietary composition and foraging efficiency of rural and urban squirrels.*
Shawntay Staley	Brian Schwartz	Development of zebra fish in urban creeks compared to rural creeks.*

Student Research & Presentations (cont.)

Student	Faculty Advisor	Senior Research Projects* & Tower Day Presentations†
Khara Tate	Glenn Stokes	Histology: a comparison of hepatic tissues of different vertebrates.†
Samantha Tillery	Bill Birkhead	Anurans in remediated wetlands.*
Fabian Vazquez	Katey Hughes	Effects of Monster Energy Drinks© on glutamate release in the neuromuscular junction of Nerve 3 of *Procambarus clarkii* and *P. zonangulus*.*
Nylvia Ware	Milwood Motley	Antiviral effects of lactoferrin at different stages of herpes simplex virus Type 1 infection of vero cells.†
Sara Waters	Katey Hughes	Effects of different fertilizers on nerve 3 activity in *Procambrarus clarkia* (freshwater crayfish).*
Uniecia White	Milwood Motley	Effects of lactoferrin when combined with acyclovir on HSV-1.*
Keosha Williams	John Barone	Inducing directional growth in *Brassica rapa*.*

Student Achievements

Internship at the Columbus Water Works (CWW)

by Cristina Caldwell

It's amazing to think of all that I've learned during my internship. I've been working in the lab only since March and already I've learned twelve different water quality analysis techniques. I test water samples for things like nitrates, sulfates, and phenols, just to name a few, using a variety of techniques ranging from simple titrations to ion chromatography. I operate machines and equipment I've only been able to observe from a distance in the past. I've learned so much already, and I'm only just beginning!

This internship allows me to use the things I've learned in my undergraduate chemistry and biology coursework on a daily basis, and it's also a great opportunity to get my feet wet (no pun intended) doing the kind of work I'm preparing for with my graduate studies. I'm getting the experience here that I need to get into a good job, and I'm learning skills I can take with me wherever I decide to go. Water is our most precious resource. People everywhere in the world are always going to need a clean supply of it, and as the need for water increases, so will the need to find ways of minimizing our impact while using it.

Aside from being an excellent place to learn, the lab is just a great place to work. I work with a fantastic group of people and they are a big part of why I enjoy this job so much. They really care about their work. I'm so glad I took advantage of this opportunity. I actually look forward to going to work, learning new things, and taking on the next challenge.

The Columbus Water Works has provided learning opportunities for students for many years and prides itself on sharing experiences and knowledge related to our business, water resources and the environment. The internship with CSU is an opportunity for students to learn more than just academics. Real world experience in a laboratory environment provides a hands-on, interactive opportunity most collegiate students are not afforded.

- William Kent (CWW)

Biology Clubs at CSU

Beta Beta Beta

Biological honor and professional society

Chapter President: Holly Mullis

Chapter VP: Catherine Wilson

Advisors: Julie Ballenger, Brian Schwartz

AMSA

American Medical Student Association

Chapter President: Neena Alex

Chapter VP: Samantha Worthy

Advisor: Jeff Zuiderveen

PVMA

Pre-Veterinary Medical Association

Chapter President: TBD

Chapter VP: TBD

Advisor: Glenn Stokes

**Correction - Melissa Melton (Redwood) founded the PVMA club at CSU with the help of Dr. Stokes; Contessa Bowman was the first PVMA president.*

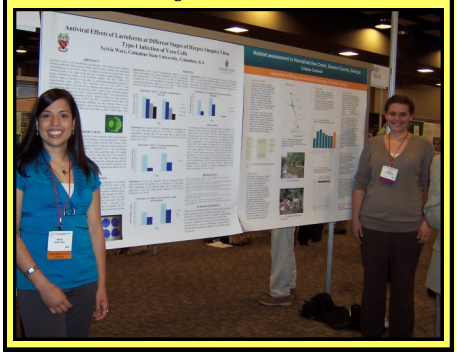
CSU Awards

Honors Convocation (April) awardees:

- **Cellular & Molecular Biology Award** - Roma Patel **recipient of 2011 CSU Faculty Cup*
- **Ecological & Evolutionary Biology Award** - Cristina Caldwell
- **George Stanton Biology Award** - Nylvia Ware
- **Organismic Biology Award** - Lauren Neil
- **Biology Education Award** - no recipient

Regional Awards

- Association of Southeastern Biologists Annual Meeting - Southeastern Regional Beta Beta Beta Award winner (1st Place Johnson Award): **Nylvia Ware** *(below, on left)*
- Columbus Water Works Outstanding Environmental Science Undergraduate Student: **Cristina Caldwell** *(below, on right)*



Student Study Abroad Experiences

Dreaming of Botswana

by Cristina Caldwell

Writing about my trip to Botswana has been surprisingly difficult. Where do I begin? How can I sum up, in a blurb, the most incredible two weeks of my life?

I guess I can start by saying that this was the best class I have *ever* taken. Instead of a normal classroom, drab and confining, the "classrooms" in Botswana are the vast reserves; seemingly endless expanses of earth and sky that are brimming with life.

The course material was everything around us; every sight, sound, taste and smell was a part of the lesson. I'm convinced that there is no better way to learn. No picture in a textbook can compare to seeing, in person, the majesty of a lion bathed in the golden light of sunrise. Someone could tell you that, due to a lack of light pollution, more stars are visible over the Central Kalahari Game Reserve, but this cold description doesn't do them justice. Until you've stood under that ink-black sky, following the path of the Milky Way and tracing the shapes of the scorpion and the giraffe, you cannot possibly understand. Botswana isn't a place you can learn about from a distance; it's something you have to experience.

"Botswana isn't a place you can learn about from a distance; it's something you have to experience."

This class was meant to teach me about the ecosystems of Botswana, but I ended up learning far more. I learned that life *is* possible, and quite pleasant, without a cell phone and Facebook. I learned how to talk to elephants. I learned about Motlhaba Basetsana and about the girl who made stars. I learned that it's possible to fall in love with a place, and that there is a deep, very real sense of loss when you have to leave it.

Readjusting to the noise and haste of the "real world" has proven to be a bit overwhelming. But whenever things get to be too much, I get to enjoy Botswana's gifts to me; the memories. I just close my eyes and remember. I remember Letiahau Valley, where I found the part of me I didn't even realize was missing. I remember the fragrance of the wild sage, purple pan weed and mopane. I remember sitting by the fire at night, blanketed in a feeling of quiet calm. I let that calm surround me again, and in the stillness, another emotion blooms. Joy, pure joy; that kind of boundless, breathless happiness I haven't felt since I was a child. It's all I can do not to grin just writing about it. I'll carry that joy with me, like a little glowing flame. I'll keep it and tend it until that day I can return.

[Cristina's class visited Botswana in May 2011]

Exploring Andros Island

by John Neill & Bill Tomkiewicz

In the summer of 2011, eleven students and one professor ventured to the Bahamas for a one-week ecology course on Andros Island. Words cannot adequately describe the experience but we will make our best effort. Andros, in two words, was *simply amazing*. We arrived on the exotic island by two six-seater planes with crystal clear blue waters below.

A few hours after touching down we found ourselves surrounded by dolphins while taking our first swim in the bay. A rare occurrence, we were fortunate to be joined by the playful mammals, as if they were welcoming us to the island. Who knew what encounter would be in store for us next – a hermit crab, a shark, or maybe the fabled chickcharnie? *(Chickcharnies are mythical elfin, bird-like creatures with piercing red eyes, three fingers, three toes and a tail, which they use to hang from trees.)*

We spent seven days enthusiastically educating ourselves about the flora, fauna, geology and local history of Andros Island. At the end of each

(continued page 7)

Student Study Abroad Experiences (continued…)

day's adventure, we would gather as a group and discuss what was to be experienced during the next day's exploration. Absorbing all of the knowledge seemed effortless in the fun, relaxed and sun-soaked atmosphere. Much was to be learned from the incredibly friendly local Bahamians, as well. When you took the time to sit and converse with them, they would share fascinating and sometimes personal stories of the island.

"Andros, in two words, was *simply amazing*."

It is safe to speak on behalf of everyone who shared this experience when we say this trip broadened our scope of the culture and ecology of Andros Island. It made us eager to plan our next adventure to the island and assist the locals with preserving this special place. It also piqued our interest as to what sorts of interesting things other countries and culture have to offer. Study abroad will definitely change the way you think about vacationing. Earning college credits should not be this fun!

[John & Bill's class visited Andros Island in May 2011]

Upcoming Study Abroad Trips:

- Costa Rica - March 2012
- Andros Is., Bahamas (Ecology) - May 2012
- Australia - May 2012
- Oxford, England (Health Issues) - summer 2012
- Andros Is., Bahamas (Health Issues) - March 2013
- Andros Is., Bahamas (Ecology) - May 2013
- Botswana, Africa - May 2013
- Oxford, England (Darwinian Evolution) - summer 2013

For more information visit:
http://bio.ColumbusState.edu

Recent Graduates

Congratulations to our December 2010 and May 2011 graduates!

B.S. in Biology:

- Jasmine Bailey (Pre-Medical)
- Nakita Benson (Pre-Vet)
- Patronya Brogdon (Pre-Vet)
- Rae Bucher
- Cristina Caldwell
- Patricia Campbell
- Timothy Duvall (Pre-Medical)
- Bailee Farmer (Pre-Medical)
- Olumuyiwa Fatade (Pre-Medical)
- Akeeta Harris
- Stewart Helton (Pre-Dental)
- Henry Hutcheson (Pre-Medical)
- Michael Joiner
- Sara Lindsey
- Lakeshia Mallard (Pre-Pharmacy)
- Elijah Mitcham (Pre-Medical)
- Tony Nguyen
- Joseph Parsi-Graciani
- Roma Patel (Pre-Dental)
- Anthony Peters (Pre-Medical)
- Clarence Powell II (Pre-Medical)
- Ashley Purvis (Pre-Dental)
- John Rivera Jr.
- Janay Ross
- Bethany Sellers
- Tyree Sharpe (Pre-Vet)
- Shawntay Staley (Pre-Medical)
- Daniel Stewart
- Samantha Tillery (Pre-Vet)
- Fabian Vazquez
- Sara Waters
- Uniecia White
- Keosha Williams

B.A. in Biology:

- Stevanie Goff
- Leonna Hart
- Zaina Jarjour (Pre-Medical)
- Morgan Jordan
- Sarah Moore
- Nylvia Ware (Pre-Pharmacy)
- Ebone Watkins (Pre-Pharmacy)

B.A. in Biology and Secondary Ed.:

- Shonda Davis

Recent biology graduates celebrate their milestone!

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Department of Biology

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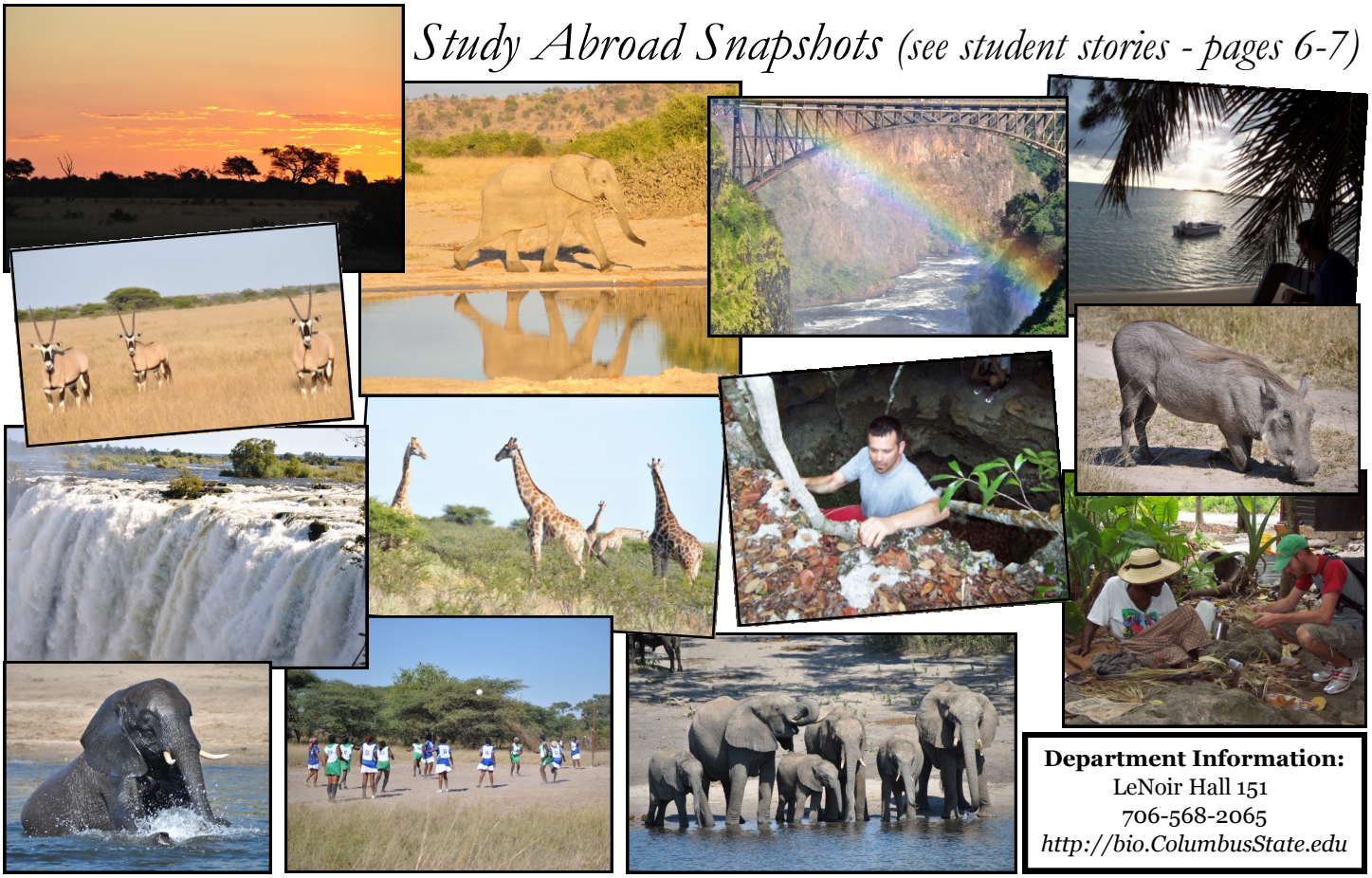
Study Abroad Snapshots *(see student stories - pages 6-7)*



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COLUMBUS STATE UNIVERSITY

Fall 2012

Volume 3

Columbus State University's

Department of Biology

Memories of R. Carson Stringfellow

Like the rivers where he searched for mussels, Carson Stringfellow's life flowed and meandered through CSU history for the past 40 years. That flow came to an abrupt and unexpected end when he passed away on January 15, 2012.

Carson grew up in Talbot County and acquired the increasingly rare skills and common sense of a country boy. He graduated from Talbot High; his (1965) yearbook noted that he ran track and his classmates voted him "friendliest." Inspired by his agriculture teacher, Dewey Turner, he enrolled in Abraham Baldwin Agricultural College. From there he transferred to Columbus College. He was a senior when I joined the faculty and Bill LeNoir assigned him to be my first lab assistant. He showed his helpful nature and many skills as he constructed insect boxes, trapped host specimens for parasitology labs and collected more than 300 insects for his entomology class. After graduation he taught biology and science at Talbot County High. Later, he served as headmaster of Woodland Academy. In addition to teaching, he coached the basketball team and even drove the school bus. Carson's dad, who also passed away this year, spent his working life as a laborer for Swift Textiles, and Carson took a position with Swift around 1975. He was a dedicated employee for more than 30 years, serving as OSHA officer and manager of laboratory and quality control.

Life's currents swept Carson back to Columbus College when a master's program in environmental science was initiated in the mid-90s. His enrollment in ecological methodology brought him flooding back into my life. A public hearing was held in Columbus by the U.S. Fish & Wildlife Service to discuss the proposed federal listing of six mussel species. I encouraged the class to attend and Carson met Drs. Jim Williams and Jayne Brim-Box, who had completed a survey of mussels in the Apalachicola-Chattahoochee-Flint river system. After the meeting Carson talked about seeing mussels in Upatoi Creek in his youth. Later, he asked if he could do a survey of mussels in selected Chattahoochee tributaries and if I would serve as his thesis supervisor. And so began the wonderful experiences of going on field trips with Carson.

In 1997 Carson completed his degree and began to teach environmental science part-time at CSU. He also began to obtain research grants to work on mussels. He forged a powerful relationship with various employees of the U. S. Fish & Wildlife Services, particularly fellow CSU alum, Sandy Abbott. Carson collaborated in many ways with federal studies and maintenance of ACF and Chipola River mussels, helping design, test, and execute mussel survey protocols. He led the publication of a poster depicting the ACF mussels, and he developed and delivered a training workshop for field scientists working with mussels. Last summer he developed a second training workshop covering mussels of the Altamaha River.

Carson Stringfellow became an old- school field biologist. He could make friends and influence people whether they were in a room at a scientific meeting or mucking for catfish in a backwater swamp. Whether swimming in the Chipola River, hiking in an Australian rainforest or slogging through a south Georgia swamp, I always felt safer when with Carson. I watched with pleasure as he held his own with many of the top mussel biologists in the country and enjoyed his company sitting outside a motel listening to the thunder roll, the tree frogs call, and the rain pour down.

I was complimented last year when Carson asked me to co-teach a course on the mussels of the ACF. Field trips, examination of an extensive collection of specimens, and a number of quality guest speakers resulted in a special course. Now, in retrospect, it is even more special to me because it was our final scientific endeavor together. His family, his former students, like Lisa Priester and Andy Hartzog, his colleagues, like Sandy Abbott and many CSU faculty and staff, continue to experience his absence acutely. Carson Stringfellow lived his life to the fullest. He discovered that which interested him and pursued it with enthusiasm. In a gentle, folksy way he touched many others along his way and for many, made their lives significantly better.

- George Stanton

Inside this issue:

Awards, Presentations & Research

Awards

John Barone - College of Letters and Sciences 2012 Faculty Fellow for Outstanding Teaching

Kevin Burgess - College of Letters and Sciences 2012 Faculty Fellow for Outstanding Research

Kevin Burgess - CSU 2012 Faculty Research & Scholarship Award – finalist

Brian Schwartz - CSU 2012 Faculty Service Award – finalist

External Grants

Kevin Burgess (PI), **John Barone** (Co-PI) and SG Newsmaster (Co-PI). RUI-Pre-Proposal: Integration DNA barcoding with field methods in the construction of pollination networks for prairie ecosystems. NSF (submitted, $599,947)

B. Brosi (PI), **Kevin Burgess** (Co-PI), P. Armsworth (Co-PI), and J. Dunne (Co-PI). Dimensions of Biodiversity: Collaborative Research: Functional pollination networks and the maintenance of species and genetic diversity. NSF Collaborative Proposal (submitted, $2,000,000)

Internal Grants

John Barone. CSU Stem Mini Grant. Use of a writing consultant in a writing course. $1836

John Barone and **Kevin Burgess**. CSU University Grant. Use of DNA barcoding of prairie flora. $9945

Kathleen Hughes. CSU Stem Mini Grant. Evaluation of two peer-assisted learning strategies in Biol 2221 (Anatomy and Physiology I). $2592

Kathleen Hughes. University Grant, Office of the Provost. Role of Estrogens in Astrocyte Viability. $2,267

Presentations

Julie Ballenger[1] and Michele Elmore[2]. Rare discoveries and range extension of endangered wetland plant species. [1]Columbus State University, [2]The Nature Conservancy. Southeastern Lake and Watershed Management Conference, Columbus, GA.

Julie Ballenger. Columbus State University Departments of Biology, Chemistry and Earth and Space Sciences Gulf Coast CESU Membership presentation at the Joint CESU Regional Meeting. St. Petersburg, FL.

John A. Barone[1] and JoVonn G.Hill[2]. Effect of habitat specialization and dispersal abilities on the metacommunity structure of plant, ants and grasshoppers in black belt prairies. [1]Columbus State University, [2]Mississippi State University. Association of Southeastern Biologists, Athens, GA (paper)

John A. Barone and K.G. Stephenson. Historical extent and ecology of southeastern prairies. Southeastern Prairie Symposium, Mississippi State University, Starkville, Mississippi.

John A. Barone and JoVonn G. Hill. Metacommunity structure of blackland prairie communities in Mississippi and Alabama. Grasslands in a Global Context Symposium. Institute for Grassland Studies, Kansas State University, Manhattan, Kansas.

JoVonn Hill and **J. A. Barone**. Evaluation of Restoration Techniques in Black Belt Prairies of Mississippi. Grasslands in a Global Context Symposium. Institute for Grassland Studies, Kansas State University, Manhattan, Kansas.

Kevin Burgess. Barcoding local floras: potential challenges and future applications. Next generation approaches to phylogenetics and phylogeography in Southeastern systems. Association of Southeastern Biologists, Athens, GA (symposium)

Cristina M. Caldwell[1], Michele Elmore[2], **Julie Ballenger**[1] and **Kevin Burgess**[1]. Introgressive hybridization in rare Georgia pitcher plants (*Sarracenia* spp.) [1]Columbus State University, [2]The Nature Conservancy. Association of Southeastern Biologists, Athens, GA (poster)

Alicia M. Garcia. Assessing the effects of restoration on phonological progression and reproductive success of the rare Georgia rockress (*Arabis georgiana* Harper). Association of Southeastern Biologists, Athens, GA (paper)

Kimberly Holley[1], **William Birkhead**[1], **Kevin Burgess**[1] and Greg Moyer[2]. Interspecific hybridization between a rare, endemic bass (*Micropterus cataractae*) and a more abundant, invasive bass (*M. punctulatus)*. Columbus State University[1], USFWS Warm Springs Fish Technology Center[2]. Association of Southeastern Biologists, Athens, GA (poster)

Lauren A. Neill and **Brian W. Schwartz**. Genetic and physiological characterization of copper utilization mutants in *Saccharomyces cerevisiae*. Georgia Academy of Sciences, Kennesaw, GA (paper)

Jeffrey Zuiderveen. Using 'Discussions' to Increase Student Connections, Cognitive Learning and Critical Thinking. Platform presentation. Second Annual Distance Learning Conference, September 29-30, 2011. Columbus State University, Columbus, GA.

Publications

Birkhead, W.S., and D. Walker. 2011. Size distribution and habitat preference of alligators spotlighted at four locations on the Eufaula National Wildlife Refuge, Barbour County, Alabama, and Stewart County, Georgia, in late May, late June, and early August. Report to the U.S. Fish and Wildlife Service, Eufaula National Wildlife Refuge.

Bringolf, R., Jennings, C and **Zuiderveen, Jeff**. 2012. "Assessment of Endocrine Disruption in Fish and Estrogenic Potency of Waters in Georgia". Report submitted to Georgia Water Resources Institute, Atlanta, GA.

Kim, S.-H, C. Harzman, **J. K. Davis**, R. Hutcheson, J. B. Broderick, T. L. Marsh and J. M. Tiedje. 2012. Genome sequence of Desulfitobacterium hafniense DCB-2, a Gram-positive anaerobe capable of dehalogenation and metal reduction. BMC Microbiol. 12:21-41.

Galloway, L. and **Kevin Burgess** (2012) Artificial selection on flowering time: Influence on reproductive phenology across natural light environments. Journal of Ecology, 100: 852-861.

Brian S. Helms, Chester Figiel, John Rivera, Jim Stoeckel, **George Stanton**, Troy Keller. Life history observations, environmental associations, and soil preferences of the Piedmont Blue Burrower (*Cambarus (Depressicambarus) harti*) Hobbs. (accepted by Southeastern Biologist, July 2012).

Newbrey, J. L., C.A. Paszkowski, and B. A. Gingras. 2012. Trophic relationships of two species of grebe on a prairie lake based on stable isotope analysis. Hydrobiologia.

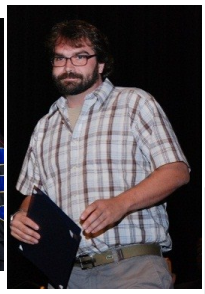
Newbrey, J. L., and W. L. Reed. 2011. Yolk and feather carotenoids in relation to female condition and reproduction in the Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*). Auk 128: 382-392.

Student Achievements

Awards (2012 Honors Convocation)

- George Stanton Award - **Neena Alex** (*right*)
- Cellular & Molecular Award - **Hemalata Mandiga** (*far right*)
- Organismic Award - **Shannon Tyler** (*bottom left*)
- Biology Education Award - **Carrie Ann Sharritt** (*below center*)
- Ecological & Evolutionary Award - **Scott Whitley** (*below right*)





Research Grants (internal)

- Hemalata Mandiga - CSU Student Research and Creative Endeavors (SRACE); Beta Beta Beta (BBB) presentation; Tower Day
- Parag Patel - SRACE; BBB presentation; Tower Day
- Mfoniso Umoren - SRACE; BBB presentation **3rd place Johnson Award*; Tower Day
- Abolanle Abikoye - SRACE
- Marisa Naciuk - SRACE; Tower Day

Georgia Academy of Sciences

- Lauren Neill (Brian Schwartz, mentor)

Beta, Beta, Beta District II Mu Omicron Chapter

(Assoc. of Southeastern Biologists Annual Meeting, Athens, GA)

- Terry Langfitt **3rd place Frank G. Brooks Award* (Milwood Motley, mentor)
- Neena Alex **2nd place Frank G. Brooks Award* (Katey Hughes, mentor); Tower Day

CSU Tower Day

- Khaliyah Abikoye (Monica Frazier, mentor)
- Neena Alex (Katey Hughes, mentor)
- Will Borin (John Davis, mentor; Honors mentor, Kevin Burgess)
- Emily Husted and Bill Tomkiewicz (International class, Andros Island; Julie Ballenger, faculty advisor)
- Emily Husted and Bolivia Hurtado de Mendoza (International class, Belize; Kevin Burgess and Jennifer Newbrey, faculty advisors)
- Hemalata Mandiga (Kevin Burgess, mentor)
- Bolivia Hurtado de Mendoza (Internship)
- Marisa Naciuk (Monica Frazier, mentor)
- Martha Newell (Internship)
- Parag D. Patel (Kevin Burgess, mentor)
- Valerie Staples (International class, Andros Island; Julie Ballenger, faculty advisor)
- Mfoniso Umoren (Kevin Burgess, mentor)
- Sydney Worthy and Elicia Walker (International class, Andros Island; Julie Ballenger, faculty advisor)

Senior Research Projects

Fourteen seniors completed independent research projects in 2011-2012. Nine presented their work at professional meetings (Association of Southeastern Biologists Annual Meeting, Athens, GA; Georgia Academy of Sciences, Kennesaw, GA; and CSU's Tower Day - Showcase of Undergraduate Research & Creative Scholarship).

Senior Research *- Evaluating the efficacy of Indian herbal medicines on cancer cells and confirming their genetic identity using DNA barcoding*

by Hemalata Mandiga

With the expansion of the herbal market in western society, there is a growing concern about the adulteration of herbal medicines. This usually occurs by substituting valuable herbs with inexpensive alternatives. We felt it was important to find ways to test the authenticity of herbal medicines. We wanted to confirm the species composition of each herbal medicine and test their efficacy on human cells. We chose anticancer herbal medicines native to the Indian subcontinent. Turmeric and curcumin are popular spices used in the practice of Ayurveda, the use of herbal medicines, and have shown to detoxify enzymes, prevent DNA damage, and decrease tumor formation.

The goal of my research was to identify the plant derivatives in herbal medicines that were in powdered form and test their efficacy on cancer cells. In order to identify the plant derivatives, we used DNA barcodes. We found that only 33% of the powdered samples matched what was on the manufacturer's label.

As a result of my research project, I have learned many new laboratory techniques. This has been an invaluable opportunity for me to gain research experience, improve my knowledge of medical ethnobotany, and improve my laboratory skills.

Research Experience for Undergraduate program - Costa Rica

by Jenise Santos

The pathogenic chytrid fungus, *Batrachochytrium dendrobatidis*, causes a disease called chytridiomycosis, which is implicated in the decline of amphibian species world-wide. Among the species that have been affected by chytridiomycota is *Craugastor bransfordii*, Bransford's litter frog, which is found in Costa Rica, Panama, and Nicaragua. During the summer, I participated in a Research Experience for Undergraduate program at La Selva in Costa Rica through the Organization of Tropical Studies. This research required me to collect Bransford's litter frogs and soil samples in the tropical rainforest in order to observe whether the soil or cutaneous layer of frogs contained anti-fungal bacteria that inhibits the growth or mitigates the effects of this deadly fungus. I never thought that I would be fortunate enough to spend two months in Costa Rica fully immersed in the rainforest and the culture of the people. This program definitely helped me to grow as a biologist. On a typical walk from the dorms in the rainforest to the laboratory I could see sloths, macaws, howler monkeys, toucans, capuchin monkeys, snakes, peccaries, and many other species. The biodiversity was just breathtaking. Being a field biologist was never something I had really considered until now. Through this experience I truly gained an appreciation and excitement for research.

Medical Internship Leads to Senior Research Project

by Sydney Worthy

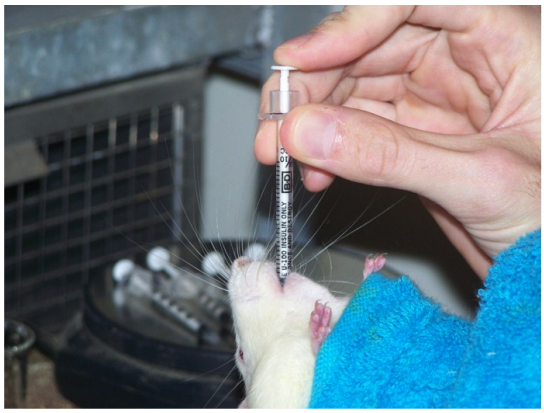
During the summer of 2012 I participated in the **Pathway to Med School** internship in Albany, Georgia, and focused my research on obesity in adolescents. My descriptive research consisted of administering surveys at ten medical clinics in southwest Georgia. I studied correlations between screen time and physical activity and the Body Mass Index of adolescents who were surveyed. Through this internship, I was exposed to primary care while shadowing physicians in family practice, internal medicine, and pediatrics.

I plan to become a physician, and this internship allowed me to gain research experience and exposure to the field of medicine. I am continuing this research project in the fall and spring for my B.S. (Biology) senior research.

Student Studies Treatment for Osteoarthritis

by John Neill

My interest in becoming a Surgical Physician's Assistant, and my personal contact with patients suffering from osteoarthritis (OA), led to my independent research on the treatment of OA. OA is characterized as cartilage deficiency within a joint that leads to bone on bone friction, which causes severe pain. Every day, many patients resort to surgery for treatment. Before reaching this costly decision, alternative treatments are commonly pursued, such as cartilage supplements (e.g. glucosamine). Manufacturers advocate this product, claiming glucosamine is a building block for joint fluid, cartilage, tendons, ligaments, membranes and blood vessels. Although this statement is valid, the manufacturers of these supplements allude to a curative benefit.



My research investigated the influence of glucosamine hydrochloride (HCl) on chondrogenesis (the growth of cartilage) in damaged elastic cartilage of rats. Sixteen male Sprague Dawley rats were used as model organisms. The experimental group received glucosamine HCl supplement for an 8-week treatment period. The remaining rats, the control group, did not receive treatment. Before and after the treatment period, cartilage was docked from the ear of the rats and collected. Collected tissues were stained by histological processes onto glass slides and observed under a microscope for counting purposes. There was no significant difference in the average number of lacunae (the location where individual cartilage cells reside) between the experimental and control group. My research found that glucosamine HCl does not appear to stimulate cartilage growth.

Student Study Abroad Experiences

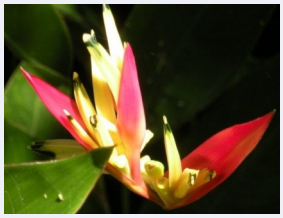
Exploring the Land Down Under

by Samantha and Sydney Worthy

Studying abroad in Australia was one of the best experiences we have had while at CSU. We spent two weeks in Cairns and other sites in North Queensland, mostly in the rainforest and tablelands. Before our trip, we were familiar with some of Australia's native birds, plants, and animals. However, we had no idea that we would see over 130 bird species and 50 plant species. We saw amazing fauna - a laughing kookaburra, a frilled-neck lizard, rock wallabies, crocodiles, wombats, and koalas. We even saw a platypus, which we did not realize was a special opportunity until a local told us that she had never seen one. One of our fellow students helped to catch a freshwater moray eel. We each conducted research projects, which further broadened our knowledge of Australia. In only two weeks, we learned so much more in the field than we could have in a classroom.

The Wonders of Belize

by Emily Husted



Upon arrival in Belize, we had a long bus ride through the countryside on bumpy unpaved roads with big rolling tree-covered mountains on either side. The scenery was breath taking! Exploring the rainforest the next morning was beautiful! Heraldo, our guide, educated us about the rainforest plants and their uses by humans.

The next day we hiked through the rainforest to a cave to see some stalactites, stalagmites and Mayan paintings. The cave had some large caverns but we had to squeeze through tight places to get to them. Heraldo took us to his house later and showed us how they make tortillas, chocolate drink from fresh crushed cacao beans, and bracelets, baskets and other crafts. After dinner one night we went back to the village for some dancing. We learned how to do a traditional Mayan dance while Heraldo and his brothers played Mayan music on the marimba. Everyone participated, even the professors!

After our time in the rainforest, we traveled to the Mayan ruins on our way to the coast. The ruins were spectacular! We climbed up the largest pyramid structure and it felt like we were on top of the world! What a beautiful piece of history! We took a boat across to South Water Caye, which has incredible views. There was so much marine life 20 feet from the beach, which we explored by snorkeling. We found a stone crab, a donkey dung sea cucumber, several sea stars, lots of juvenile fishes and some giant hermit crabs. I couldn't wait to get out to the reef the next morning! We saw French Angels, Grunts, Parrot fish, Sargent Majors, lobsters, puffer fish, Christmas tree worms, squirrel fish, sponges, and sea fans.

During the trip, we gathered data for projects on hermit crabs, Coccoloba trees, fishes, and mangroves at the Caye, and bird, plant, termite, and river related projects in the rainforest. On our way to the airport we stopped in Belize City and visited the Belize Zoo, where we had our own private night tour! I got to pet a jaguar's paw, a kinkajous' paw and a tapir! We saw some howler monkeys and they were so loud! I learned so much from the professors and the guides on the trip as well as from my classmates. I would love to return to Belize one day!

Health Issues Studied in Oxford, England

In summer 2012, the first science course was taught at the Spencer House in Oxford. The course, Universal Health Care Systems and Health Care Reform in America, was for students interested in pursuing careers in medicine and biomedical science. They studied England's National Health Service and conducted a comparative study on diabetes in the U.S. and U.K. As part of the course, students visited several science museums, met with physicians, toured the Royal London Hospital, Chelsea Physics Garden (original apothecary garden for the hospital), and Oxford University's Medical School. Prior to going to Oxford, students conducted research on the drug Metformin (most commonly used in the treatment of diabetes) in pancreatic cells. While in Oxford, the class toured the Oxford Botanical Gardens (*pictured at left*) with Dr. Alison Foster, curator of the gardens, who discussed the various medicinal plants in their garden as well as those important for the treatment of diabetes. As a highlight, she showed the class the plant *Galega officinalis*, from which Metformin was produced.

New Study Abroad Programs Begin in 2013

Natural Environments and Ecology of Tanzania

This class, in May 2013, will introduce students to East Africa and the environments of the ancient rift valley. Students will see the great migration of nomadic herbivores constantly on the move in search of fresh grass. Herds cross the Mara River from Tanzania to Kenya and back again in a constant cycle, following the rains and new plant growth. Students will visit Olduvai Gorge, the cradle of mankind, before dropping into the Ngorongoro Crater, an extinct volcano and part of the geologically active rift valley. Students will explore Ruaha National Park, a pristine environment with little human impact, where animal interactions and behaviors can be observed.

Students will develop on-site projects that will assess distribution, interactions and behavior of the various animals in the different habitats. Upon return to CSU, students will analyze their data and present their findings. Experiencing the flora and fauna of east Africa, as well as meeting and interacting with the proud people who live in Tanzania, will give CSU students a better understanding of the constant effort and sacrifice that is required to survive in this wild, yet delicate, ecosystem.

The Ecology and Evolution of Ecuador and the Galapagos Islands

This course, to begin March 2013, will focus on the area where Charles Darwin started developing his focus on natural selection and evolution. The eight-day trip begins in Quito, Ecuador and includes a visit to the equator. The class will then travel to the Galapagos Islands and stay in a motel on one of the islands. For the next three days, the class will see sights at several of the islands, including the breeding stations for the Galapagos tortoises, and experience snorkeling with sea lions. At the end of the course, the group will return to Quito and visit Mt. Cotopaxi, the second largest active volcano in the world, about 13,000 feet above sea level.

Darwin & Evolution at Oxford University

This course reviews the history of evolution and Charles Darwin's contribution to this field of inquiry. While the emphasis is on Darwin's life, the pivotal contributions of other scientists to the concept of evolution are also explored. The course reviews the social, philosophical, and theological issues associated with the development of Darwin's Origin of Species, which is also explored as a product of the man and his age. This course provides a unique opportunity to experience the historical places that not only played a major role in the development of Darwin as a scientist but also his idea that is now central to the field of biology. Excursions include visits to Cambridge University, the Natural History Museum in London, and Darwin's home, Down House.

Upcoming Study Abroad Trips:

- Galapagos (Ecology) - March 2013
- Andros Is., Bahamas (Health Issues) - May 2013
- Tanzania (Ecology) - May 2013
- Oxford, England (Darwinian Evolution) - July 2013

For more information visit:
http://bio.ColumbusState.edu

Recent Graduates

Congratulations to our December 2011 and May 2012 graduates!

B.S. in Biology:

- Ifeoma Akuta (Pre-Medical)
- Neena Alex (Pre-Medical)
- Matthew Goodson
- Hannah Hendricks
- Terry Langfitt (Pre-Medical)
- Oscar Machado (Pre-Medical)
- Roseann Manasan (Pre-Dental)
- Hemalata Mandiga (Pre-Medical)
- Marisa Naciuk
- John Neill
- Lauren Neill
- Parag Patel (Pre-Medical)
- Jaime Reed
- Shannon Tyler (Pre-Veterinary)
- Mfoniso Umoren (Pre-Medical)

B.A. in Biology:

- Chanda Adams
- Ashlin Allen (Pre-Medical)
- Natasha Arora (Pre-Medical)
- Marquivia Clark (Pre-Pharmacy)
- Kayla Harpe
- Vanessa Jackson (Pre-Medical)
- Faraji Prator
- Ileana Ramirez

Alumni News

* Send updates to: Julie Ballenger (Ballenger_Julie@ColumbusState.edu) or *Columbus State University - Department of Biology* on Facebook.

1994 - Brandon Hill - graduated from Morehouse School of Medicine (M.D.) in 1999, board certified in internal medicine and allergy/immunology; lives in Tennessee.

2000 - Noel Bryan Hayes earned her Master's and Specialist degrees in Elementary Education from Troy State University in Phenix City. She has been teaching at the Phenix City Elementary School for the past 10 years. Noel is married and has a son, Carter Cole.

2000 - Jeremy Dockery earned his M.Ed in 2003 and Ph.D. in 2006 and is currently the Assistant Principal of Curriculum and Instruction at Baldwin High School in Milledgeville, Georgia. Jeremy is married to Anita Guerrero Dockery and they have a daughter, Whitney.

2000 - Ruth Ann Welch Baird graduated from the University of Georgia's College of Medicine in 2005 and is currently working as a veterinarian at the Shiloh Veterinary Hospital in Kennesaw, Georgia. Ruth Ann married Patrick Baird (Geology 2000) and they have two children, Caroline & John.

2002 - Matt Breedon earned his Juris Doctorate from Mercer University in 2005. He currently serves as the Chief Assistant District Attorney for the Dougherty Judicial Circuit, is a member of the Albany-Dougherty SWAT team, and is the Special Assistant United States Attorney for the Middle District of Georgia. He also serves on the Board of Advisors for the Darton College Paralegal Program. Matt is married to Genevieve and they have three children.

2003 - Amy Gamble Coker is a lab analyst at Columbus Water Works. Amy is married to Brian and they have two sons, Ethan and Logan.

2003 - Mary Hill Johnson is the Assistant Director of the Coca-Cola Space Science Center in Columbus, GA. She is married to Brian and they have a son, Ethan.

2003 - Joseph Thames is a contractor on Fort Benning working with the Environmental Management Division. Joey is married to Erin Quinn Thames and they have a son, Sully Hollis (the next generation biologist).

2004 - Rebecca Allen earned her Ph.D. in Immunology from Ohio State University. Her research focused on the effects of stress on immune function. She is currently applying to Medical School.

2004 - Dorothy Cheruiyot earned her MS in Environmental Science from CSU in 2009 and her Ph.D. from Auburn University in 2012. Her research focused on plant-insect interactions and bioaccumulation of environmental toxins. Dorothy is teaching biology and coaching cross country at Brookstone High School.

2005 - Brett Harris Brooks graduated from Auburn University's College of Veterinary Medicine in 2009. She is married to Stuart Brooks who is serving at Fort Rucker in the Blackhawk Flight School. Brett is working as a relief veterinarian in Enterprise and Dothan, Alabama.

2006 - Sarah Duncan graduated from Tuskegee University School of Veterinary Medicine in 2010 and is working as an associate veterinarian at Northside Animal Hospital in Columbus, GA.

2006 - Julie Monks is currently deployed in Afghanistan as an Army Reservists where she is serving our country as an Intelligence Analyst.

2007 - Amanda Bergren graduated from the University of Georgia's College of Veterinary Medicine in 2012 and is continuing her education in an internship in large animal medicine and surgery at the University of Georgia.

2007 - Contessa Bowman graduated from Tuskegee University School of Veterinary Medicine (DVM) in 2012 and is working as an associate veterinarian at B&A Animal Hospital in Boaz, Alabama.

2007 - Lauren Eklund Demko works for PSS World Medical as an account manager with a focus on orthopaedics and pain management for physicians dispensing in Columbus and the surrounding areas; married to Nick Demko.

2008 - Bliss Lucas earned an MEd in Secondary Science Education from CSU in 2010 & is currently working on her EdS in Instructional Technology from the University of West GA while teaching 7th grade Life Science in Phenix City, AL.

2009 - Kimberly Sheena Holley completed her MS in Environmental Science from CSU in 2012 and is working as a watershed technician with Engineering and Environmental Inc. on Fort Benning.

2009 - Meredith Gilbert - completing a Pharm.D at Mercer University College of Pharmacy & Health Sciences (graduation May 2013); hopes to practice clinical pharmacy after completing a pharmacy practice residency; engaged to Joshua Plock (wedding June 2013).

2010 - Eli Mitcham worked at Meriwether Internal Medicine in Warm Springs, GA and is currently in his first semester at Mercer School of Medicine.

2010 - Jennifer Silvers earned her MS in Environmental Science from CSU and is now pursuing her DVM from the Tuskegee University School of Veterinary Medicine.

2011 - De'smond Henry is in his second year of medical school at St. Matthew's University School of Medicine.

Alum Award Winner

Jason Harrison (B.S. Biology 2000) is CSU's College of Letters & Sciences 2012 Alum of the Year for Sciences and Mathematics. He graduated *magna cum laude* from CSU in 2000 and worked at the Medical Center as a radiology technician while completing his studies. Jason's senior research on blue crabs along the Georgia coast received a *Frank G. Brooks Award* from Tri-Beta Biological Honors Society for excellence in undergraduate research. Jason credits his research experience at CSU with giving him the foundation and understanding of the process of science. He received his Ph.D. in 2005 from the University of South Alabama, Mobile, where he found his true calling in neurobiology. He received his M.D. in neurosurgery in 2009 and is currently a resident physician in neurosurgery at VCU (Virginia Commonwealth University Medical Center).

Meet our newest faculty member...

Cliff Ruehl is an Assistant Professor of Biology, specializing in zoology. He received his B.S. in Biology from Trinity University, M.S. in Wildlife and Fisheries from Texas A&M University, and his Ph.D. in Biology from Florida International University. Prior to his appointment at CSU, Dr. Ruehl was an instructor in the Department of Biology at East Carolina University. Dr. Ruehl's research concentrates mainly on aquatic invertebrates and the interface of evolutionary biology, population ecology and community ecology.

COLUMBUS STATE UNIVERSITY

Department of Biology

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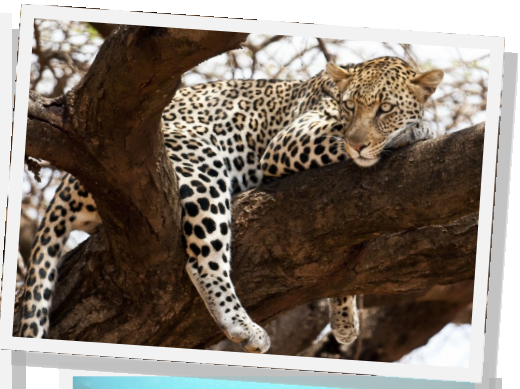
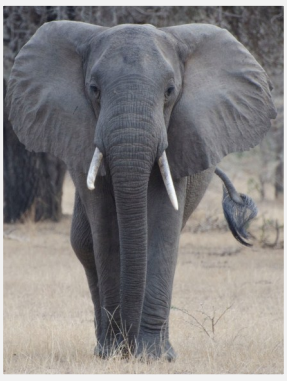
Study Abroad Snapshots *(see student stories - page 5)*




Department Information:
LeNoir Hall 151
706-568-2065
http://bio.ColumbusState.edu

Appendix 9. Major Area	Assessment Indicator Title	Topic	Course	Biology Courses					Coverage
				2285	3215	3216	3217	3218	
Cell Biology Note that 12 out of 103 topics are not covered in our core courses, including BIOL 2285. 28 topics are covered twice. Three topics are covered three times. Two topics are covered four times.	Biochemistry and cell energetics	Biological molecules			✓				1
		Protein synthesis, modification, and sorting			✓				1
		Enzyme activity and regulation			✓				1
		ATP and cell energy			✓				1
		First and second laws of thermodynamics			✓				1
		Cell-cell communication			✓				1
	Cell structure and function	Organelles and cell components			✓				1
		Cytoskeleton and cell motility			✓				1
		Cell membrane structure and function			✓				1
		Extracellular space			✓				1
		Cell and germ theories			✓				1
		Distinctions among three domains of life			✓				1
		Cell growth and division (mitosis and cytokinesis)			✓	✓			2
Molecular Biology and Genetics	Molecular biology and molecular genetics	DNA replication and mutation			✓	✓			2
		Gene structure, introns, and exons			✓	✓			2
		Regulation of gene expression			✓	✓			2
		RNA transcription and modification			✓	✓			2
		Translation of mRNA			✓	✓			2
		Bacteriophages and viruses			✓	✓			2
		Genetic control of development; cancer			✓				1
		Immunogenetics			✓				1
		Genetic engineering			✓	✓			2
	Heredity	Meiosis and chromosomal alterations			✓	✓			2
		Modes of inheritance				✓			1
		Probability and pedigrees				✓			1
		Segregation, recombination, and chromosome mapping			✓	✓			2
		Polyploidy and aneuploidy							0
		Sex determination				✓			1

		Non-Mendelian inheritance				✓			1
		Prokaryotic genetics			✓	✓			2
Organismal Biology	Diversity of organisms	General biology of major groups of organisms						✓	1
		Origin of life and endosymbiont theory			✓			✓	2
		Fossil record and human evolution							0
		Systematics and molecular phylogeny						✓	1
		Adaptations to habitats						✓	1
	Organismal - Animals	Digestion and nutrition							0
		Excretion and osmoregulation						✓	1
		Gas exchange and ventilation						✓	1
		Circulatory systems						✓	1
		Support and movement							0
		Nervous and endocrine systems			✓			✓	2
		Integument						✓	1
		Immune system							0
		Metabolic rates and energy			✓				1
		Reproductive structures and gametogenesis						✓	1
		Fertilization, cleavage, and gastrulation			✓			✓	2
		Comparative embryology						✓	1
		Reproduction in nonchordate animals							0
	Organismal - Plants	Roots, stems, leaves						✓	1
		Plant energetics			✓			✓	2
		Water relations						✓	1
		Mineral nutrition						✓	1
		Translocation and storage						✓	1
		Hormones, photoperiods, and tropisms			✓			✓	2
		Nonphotosynthetic strategies						✓	1
		Reproductive structures, gametogenesis, and sporogenesis						✓	1
		Fertilization and alternation of generations						✓	1
		Embryogeny and germination						✓	1

		Meristems and growth						✓	1
Population Biology, Evolution, and Ecology	Population genetics and evolution	Genetic variability and polyploidy				✓		✓	2
		Distributions of genetic variabilty				✓		✓	2
		Hardy-Weinberg equilibrium, genetic drift				✓		✓	2
		Heritability, fitness, and adaptation				✓		✓	2
		Natural selection				✓		✓	2
		Modes of speciation						✓	1
		Isolating mechanisms						✓	1
		Convergence, divergence, and adaptive radiation						✓	1
		Extinction						✓	1
		Evolution of higher taxa						✓	1
		Evolutionary rates and punctuated equilibrium						✓	1
		Evidence for evolution						✓	1
		Molecular evolution							0
		Neutral mutations							0
		Coevolution						✓	1
	Ecology	Biogeographic and temporal patterns						✓	1
		Biomes					✓		1
		Climate					✓		1
		Habitat selection, tolerances, limiting factors, and resource acquisition					✓		1
		Demography and population dynamics					✓		1
		Animal behavior					✓	✓	2
		Competition, predation, parasitism, and symbiosis					✓		1
		Community structure and niche					✓		1
		Species richness and species diversity					✓	✓	2
		Change and succession					✓		1
		Introduced species					✓	✓	2
		Energy flow, biogeochemical cycling, and decomposition					✓		1
		Productivity					✓		1

		Food webs							0
		Human demography							0
		Resource depletion and pollution							0
		Economic botany						✓	1
		Habitat modification and effects on organisms					✓	✓	2
		Emerging diseases, endemic diseases							0
Analytical skills		Understanding quantitative aspects and limits of science		✓					1
		Hypotheses and theories		✓			✓		2
		Identification and testing of hypotheses		✓	✓	✓	✓		4
		Identification of variables and establishing controls		✓	✓		✓		3
		Ensuring that measured parameters are affected by phenomenon being studied		✓					1
		Application of information to solve a problem or make a prediction		✓	✓	✓			3
		Quantitative proficiency and units of measure			✓		✓		2
		Probability theory and statistics		✓		✓	✓		3
		Interpretation of data, graphs, tables, and statistical analyses		✓	✓	✓	✓		4

School Name	Number of Students
Armstrong Atlantic State University, GA	49
Auburn University – Montgomery, AL	37
Augusta State University, GA	176
Georgia Southwestern State University, GA	35
James Madison University, VA	141
Lamar University, TX	136
North Georgia College and State University, GA	207
Northeastern Illinois University, 15 IL	15
Troy University – Troy, AL	180
University of North Alabama, AL	152
University of North Florida, FL	173
University of Northern Colorado, CO	180
University of Tennessee – Chattanooga, TN	213
University of Texas at Tyler, TX	31
University of West Georgia, GA	216
Valdosta State University, GA	316
Total	**2257**

Appendix 11. 2011 Biology Major MFT Scores